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Hansen

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(54) **SYSTEM AND METHOD FOR ASSEMBLING STRUCTURAL INSULATED PANELS**

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E04B 1/61 (2006.01)
E04B 1/14 (2006.01)

(52) **U.S. Cl.**
CPC ***E04B 1/6162*** (2013.01); ***E04B 1/14*** (2013.01)

(58) **Field of Classification Search**
CPC E04B 2002/7461; E04B 2002/7474; E04B 2002/0243; E04B 2002/0245; E04B 2002/0247; E04B 1/6145; E04B 1/6162; E04B 1/14; E04B 1/6137; E04B 1/6141; E04B 2/7425; E04B 2/705; E04B 2/7433; E04B 2/7437; E04B 2/7444; E04B 2002/7446; E04B 2002/7462; E04B 2002/7464; E04B 2002/7487; E04C 2/296; E04C 2/292; F16B 5/0052; A63D 33/105; E04F 2201/05
USPC 52/794.1, 464, 586.1, 586.2, 585.1
See application file for complete search history.

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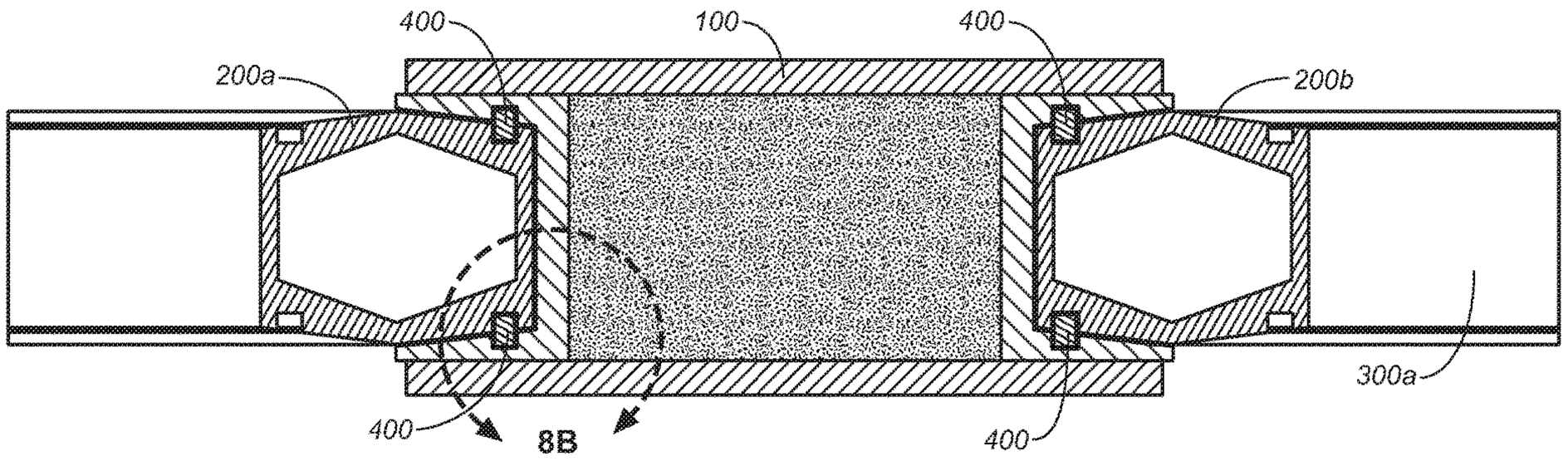
(57) **ABSTRACT**

A system for assembling structural insulated panels (SIPs) includes a set of splines that snugly insert into channels along the top, bottom and side edges of each SIP. Vertical alignment splines are used to align and connect adjacent SIPs and horizontal plate splines are used to cap edge channels of a SIP such that the edges of the SIP can securely rest on, support or be affixed to a foundation or other structural member. The system components facilitate fast and precise alignment, interconnection and installation of SIPs in order to form walls, floors, roofs or foundation systems.

15 Claims, 23 Drawing Sheets



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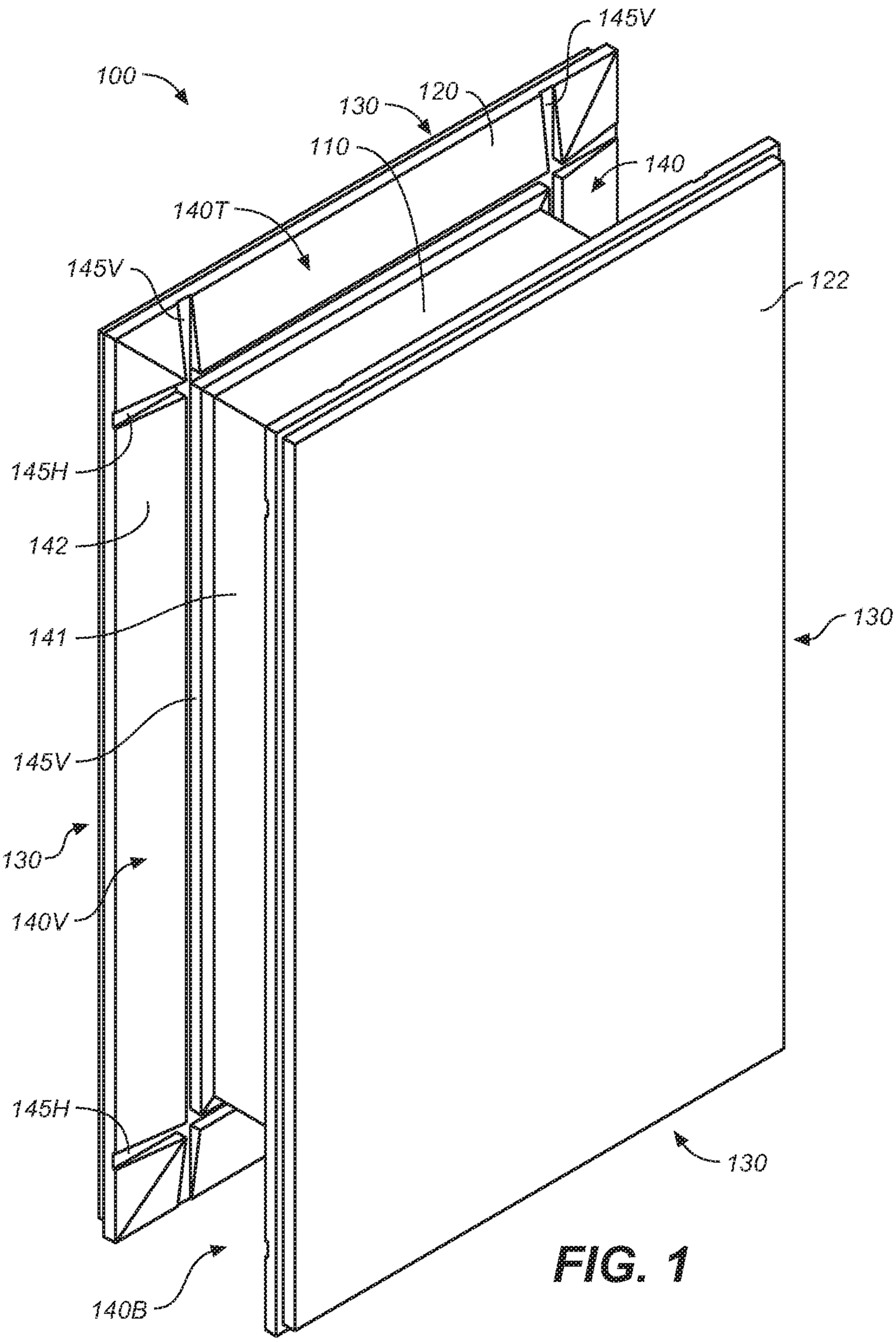
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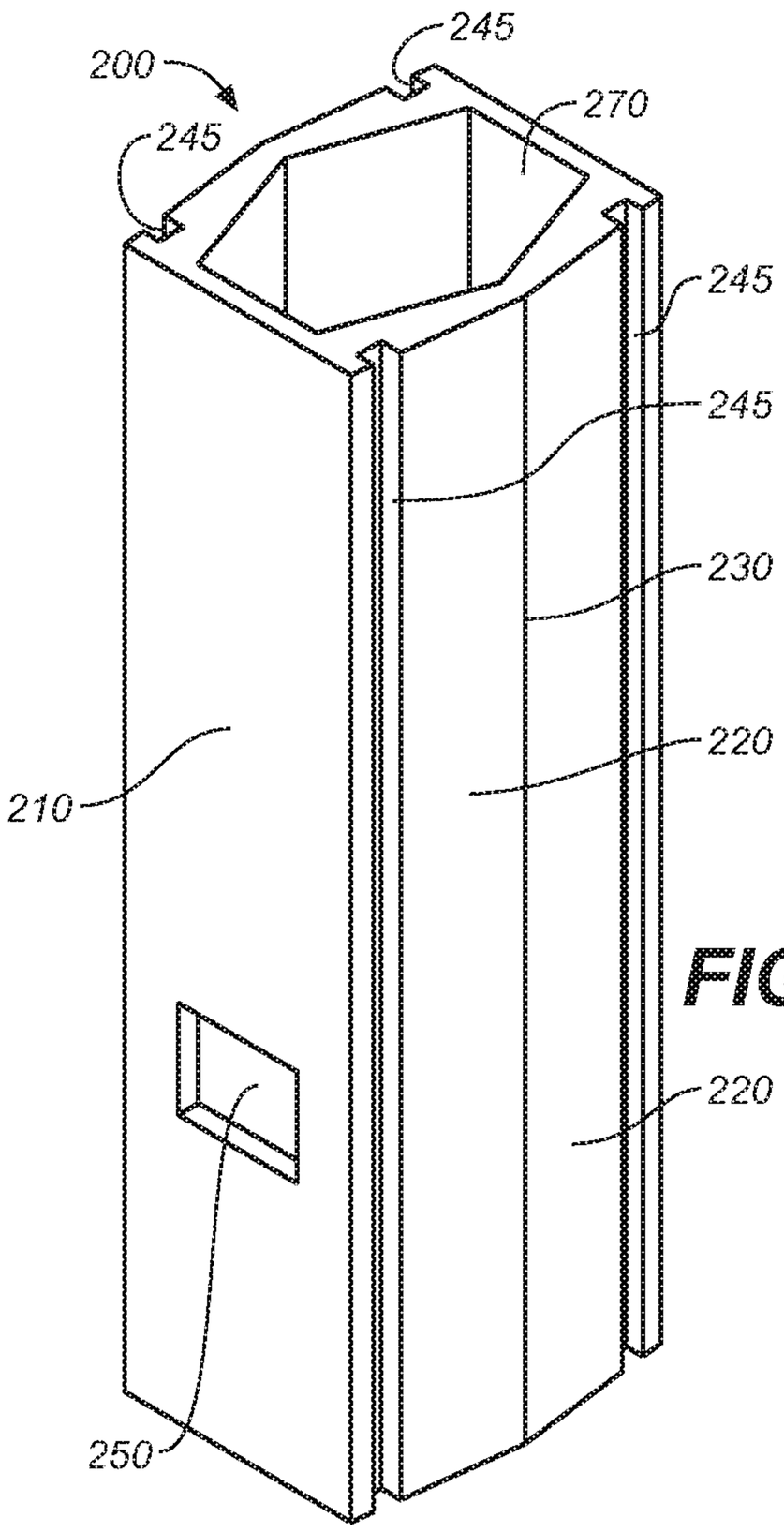
FIG. 1



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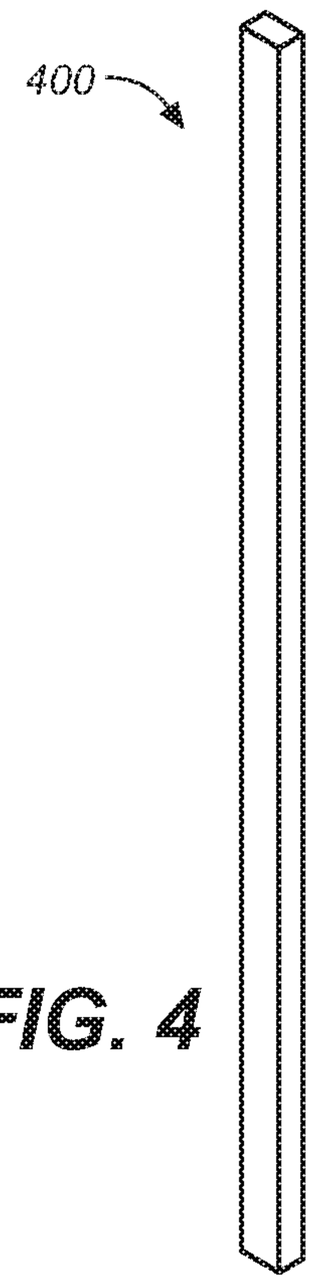

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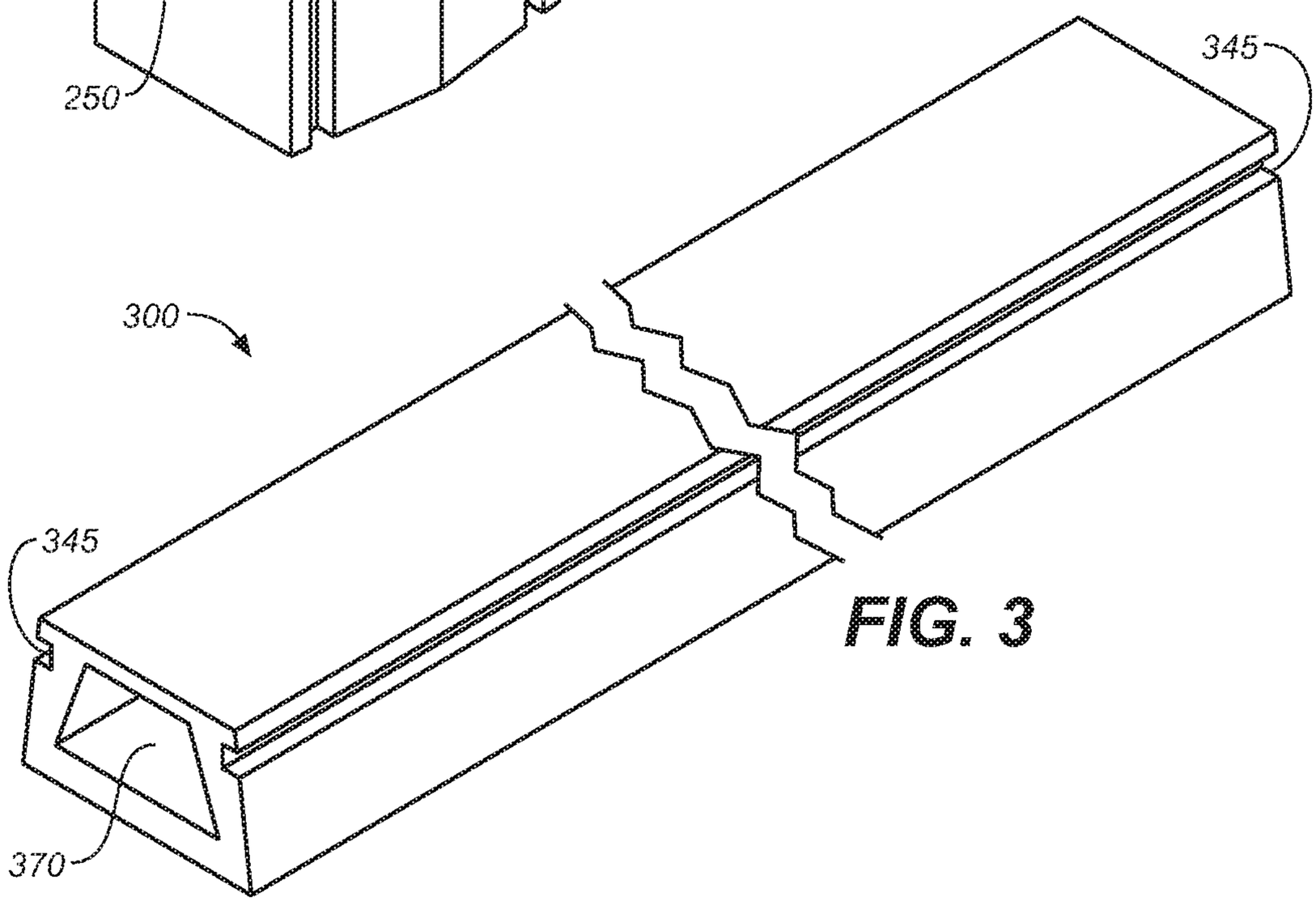

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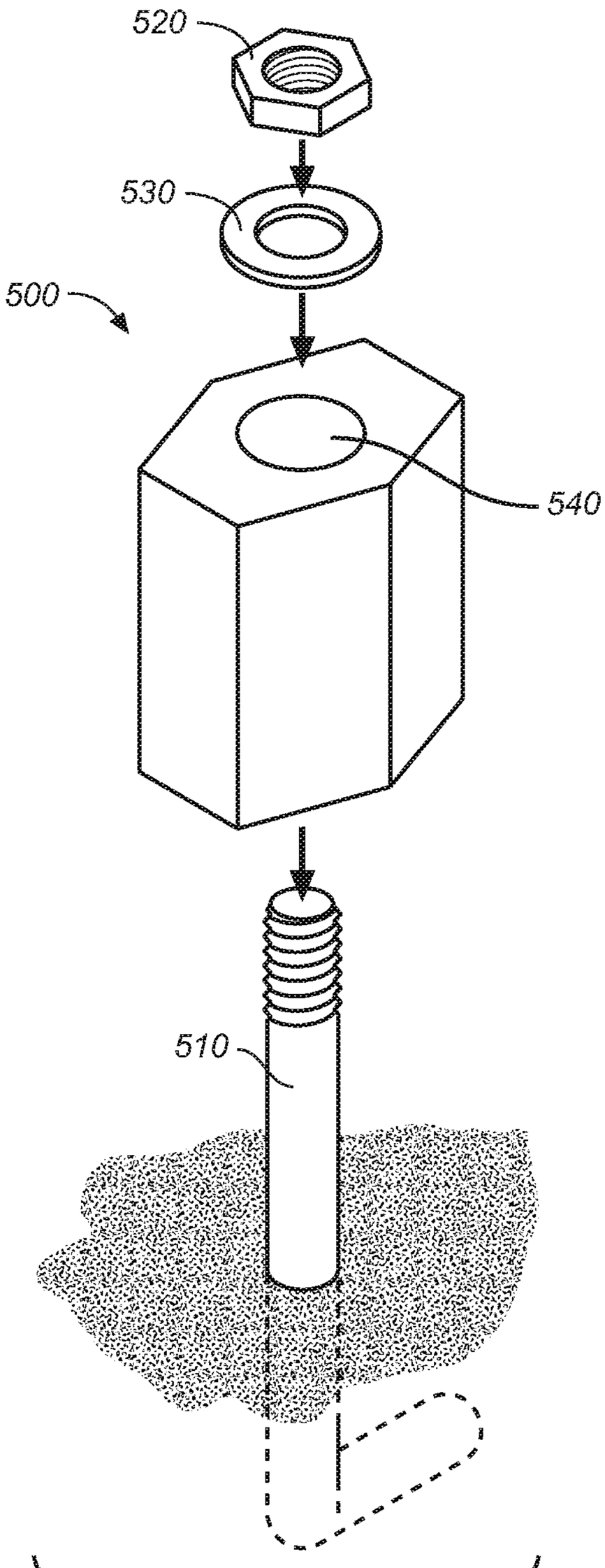

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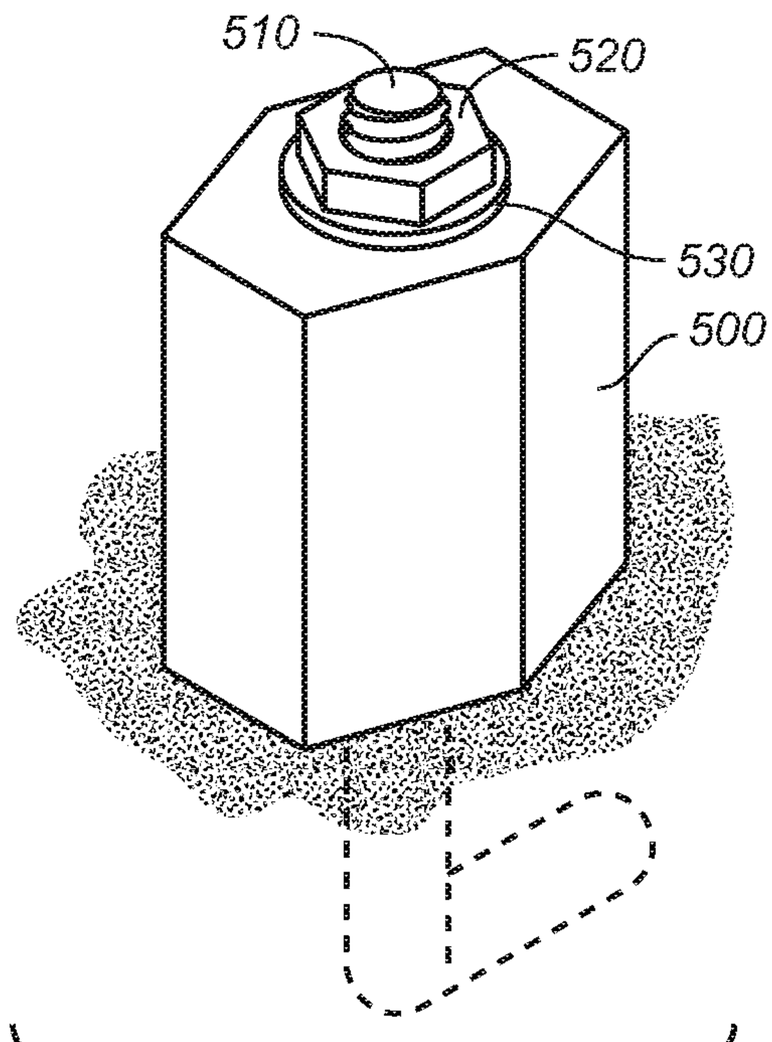

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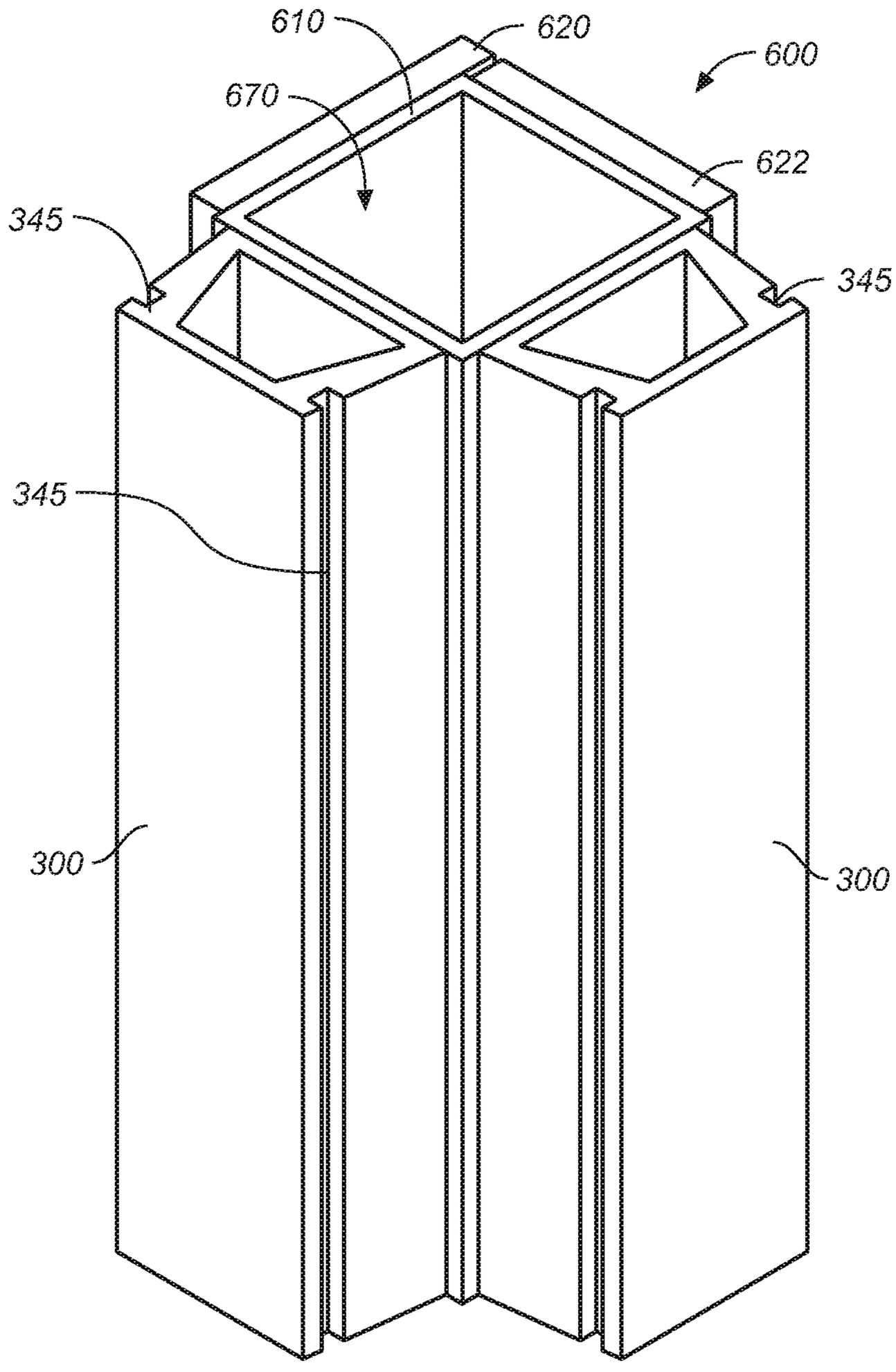

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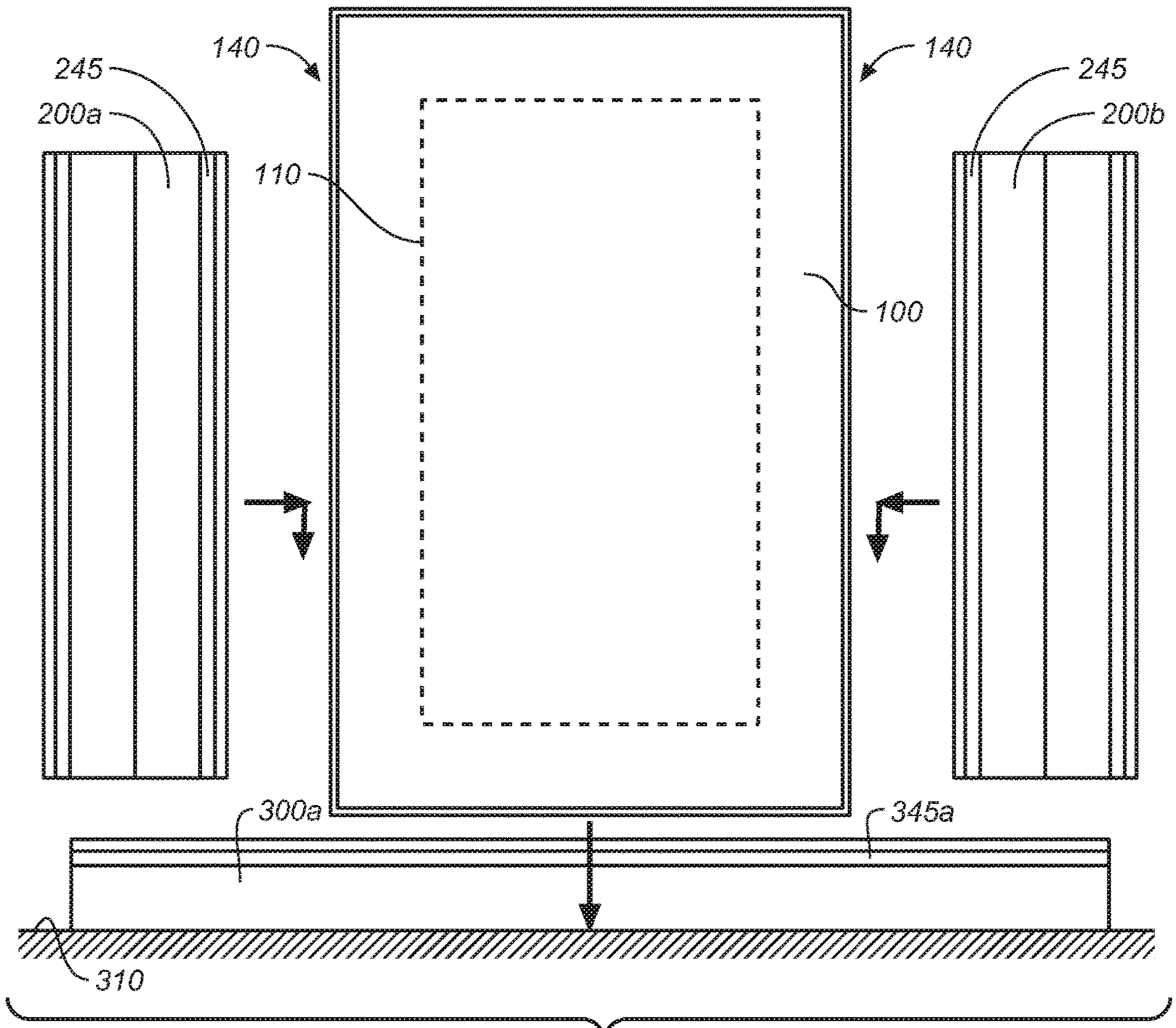

FIG. 7A

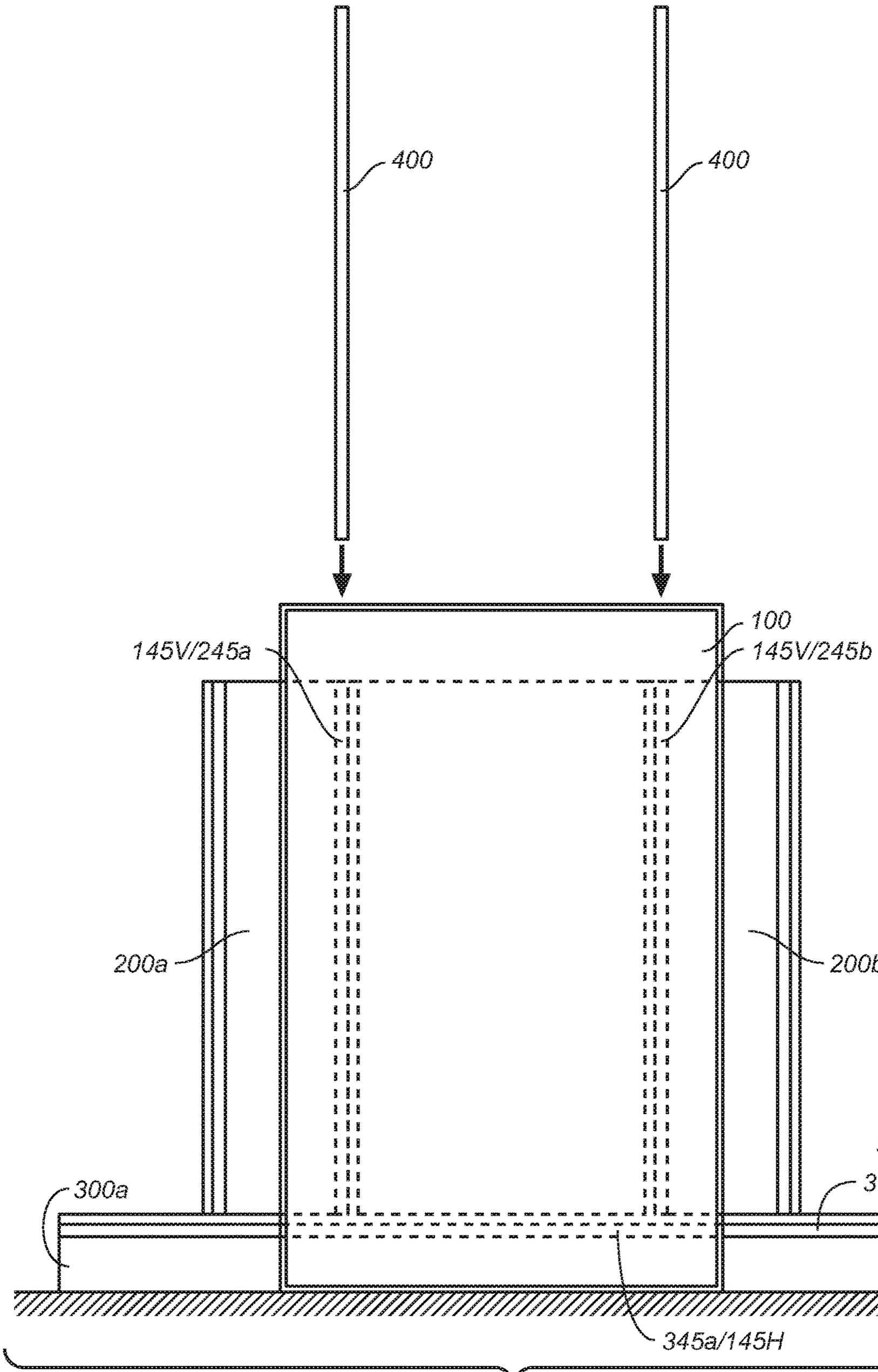
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FIG. 7B

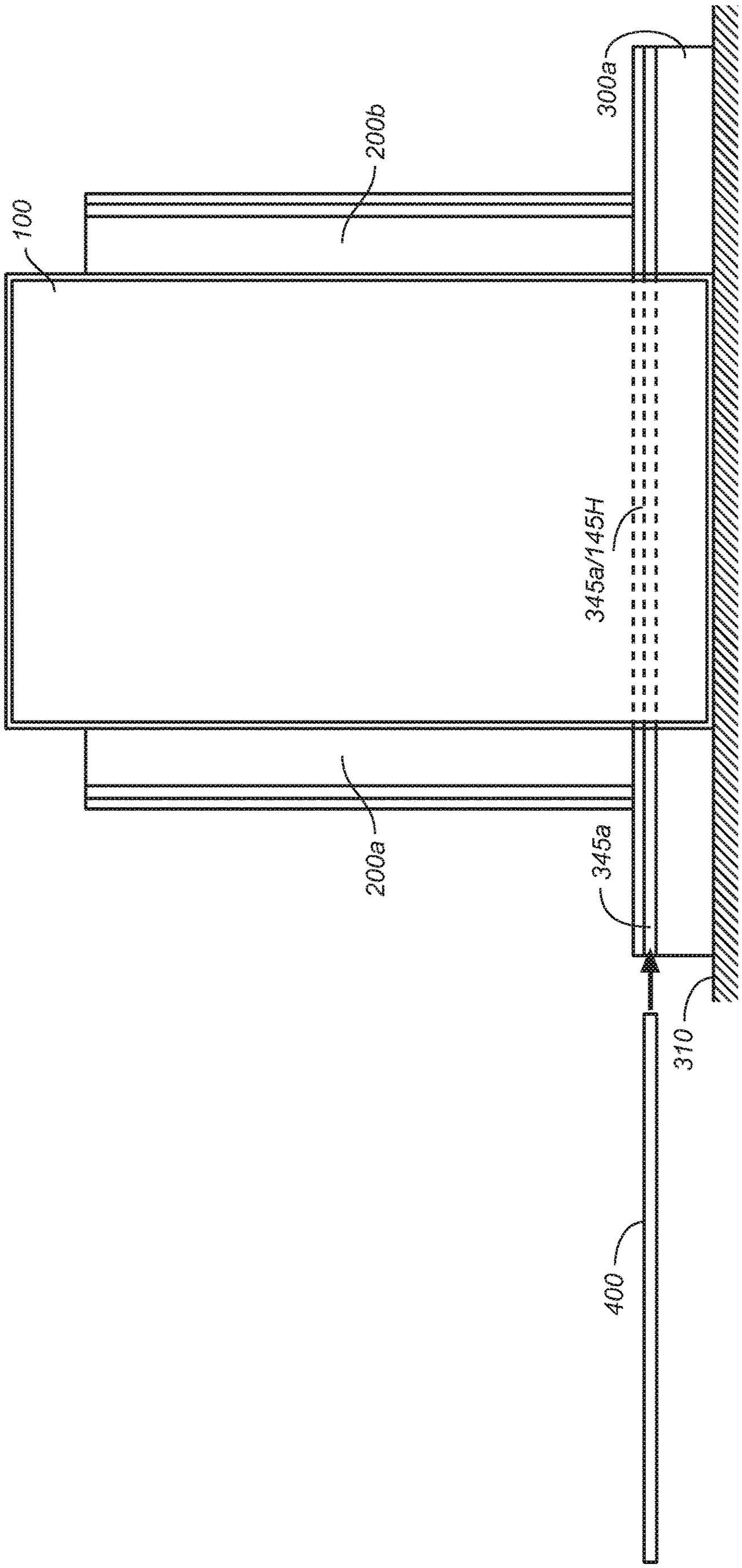


FIG. 7C

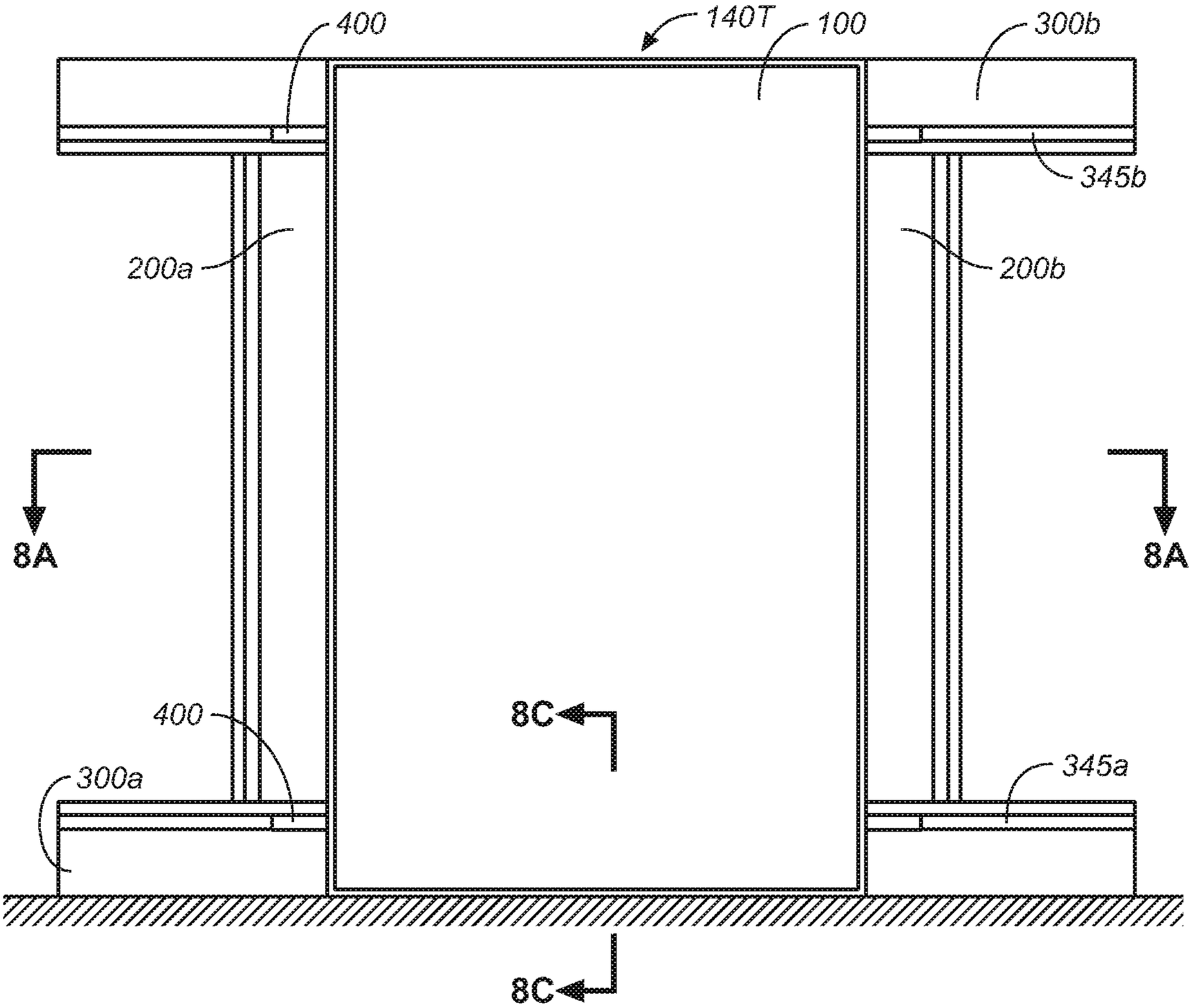


FIG. 7D

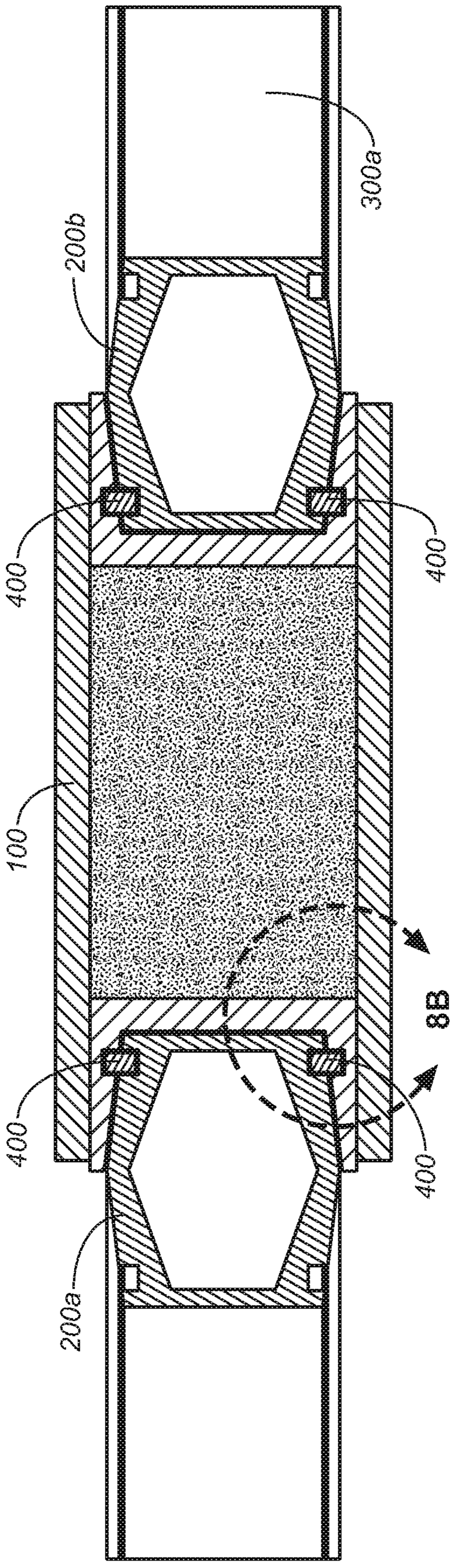
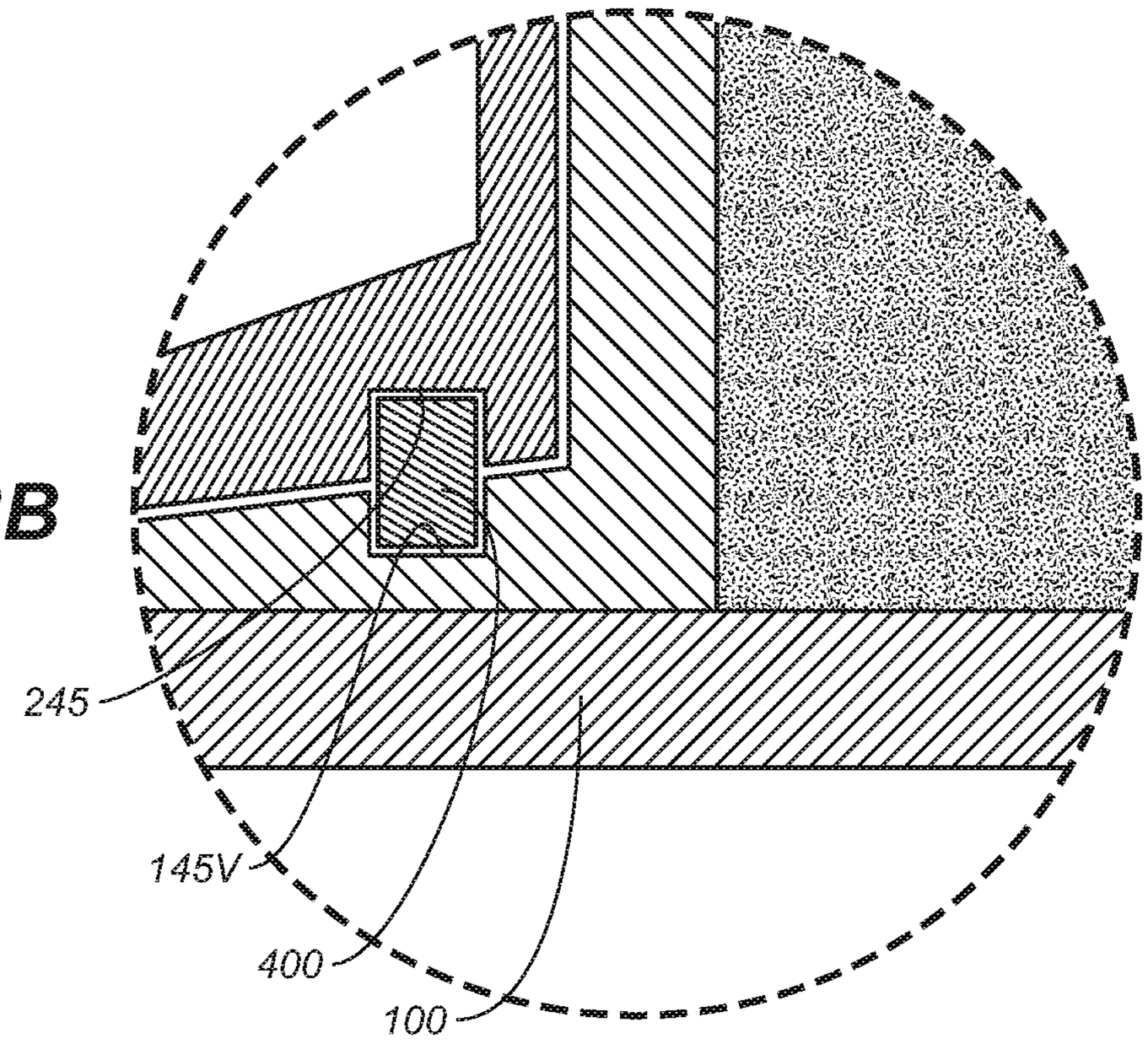
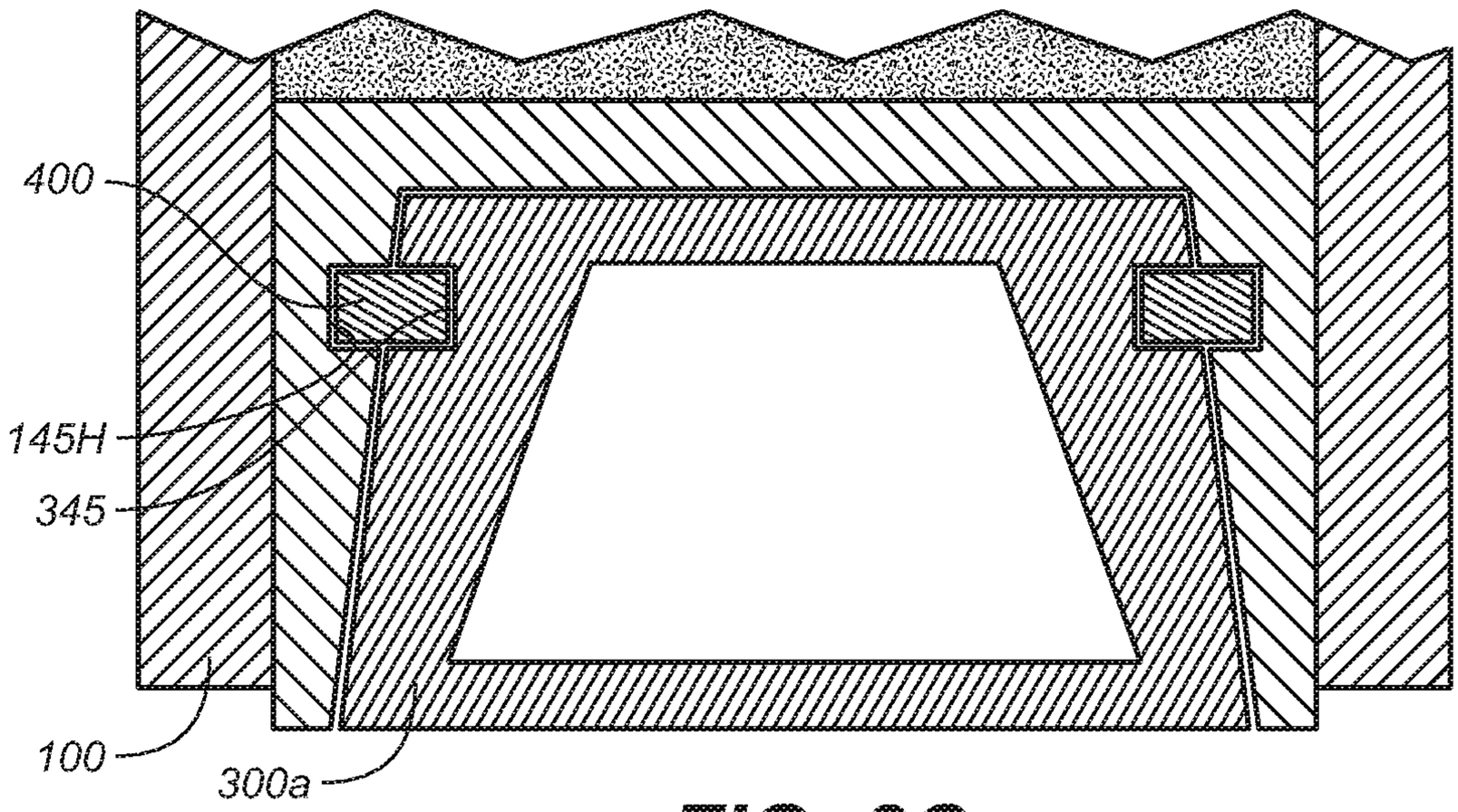


FIG. 8A

FIG. 8B





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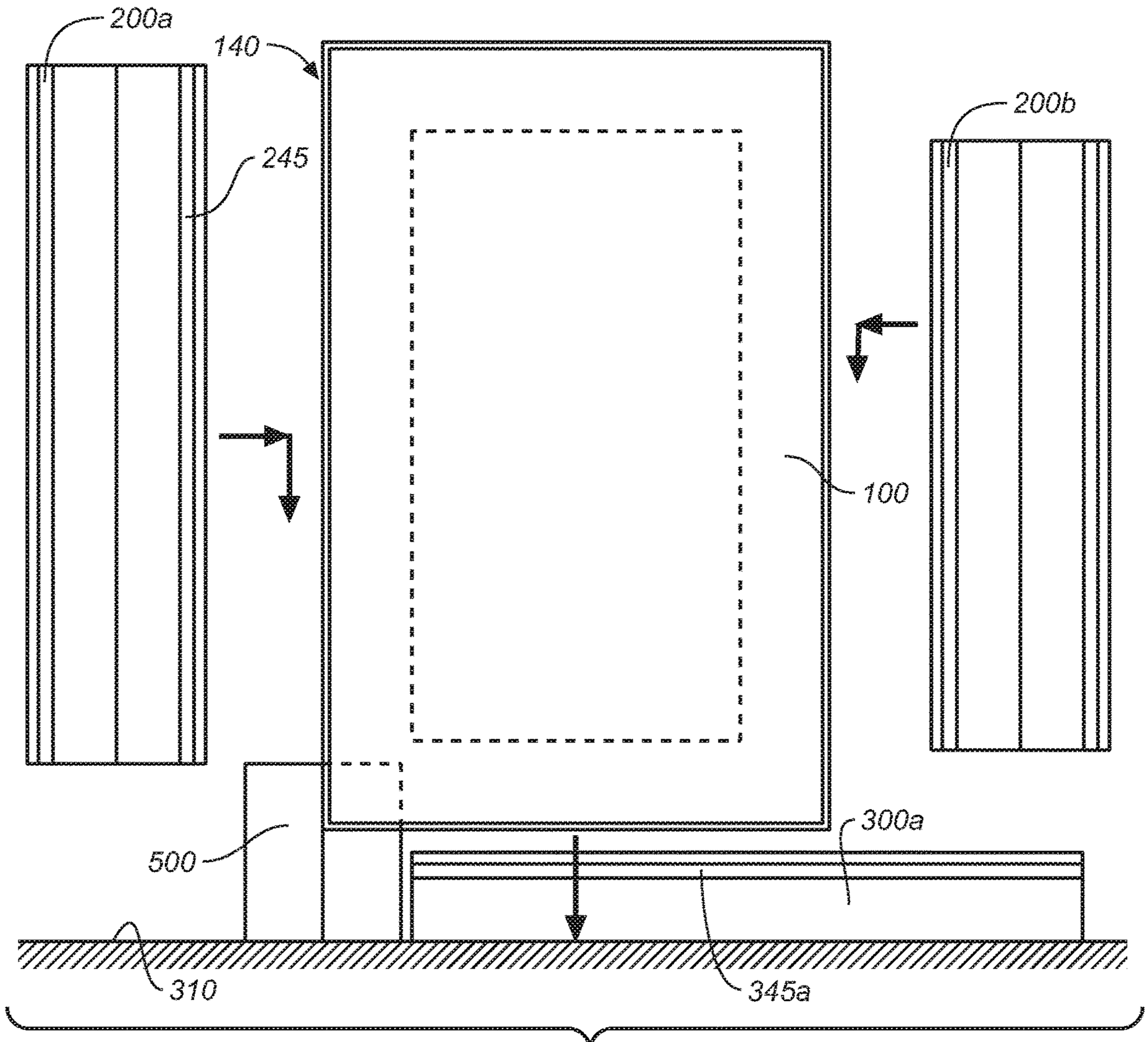
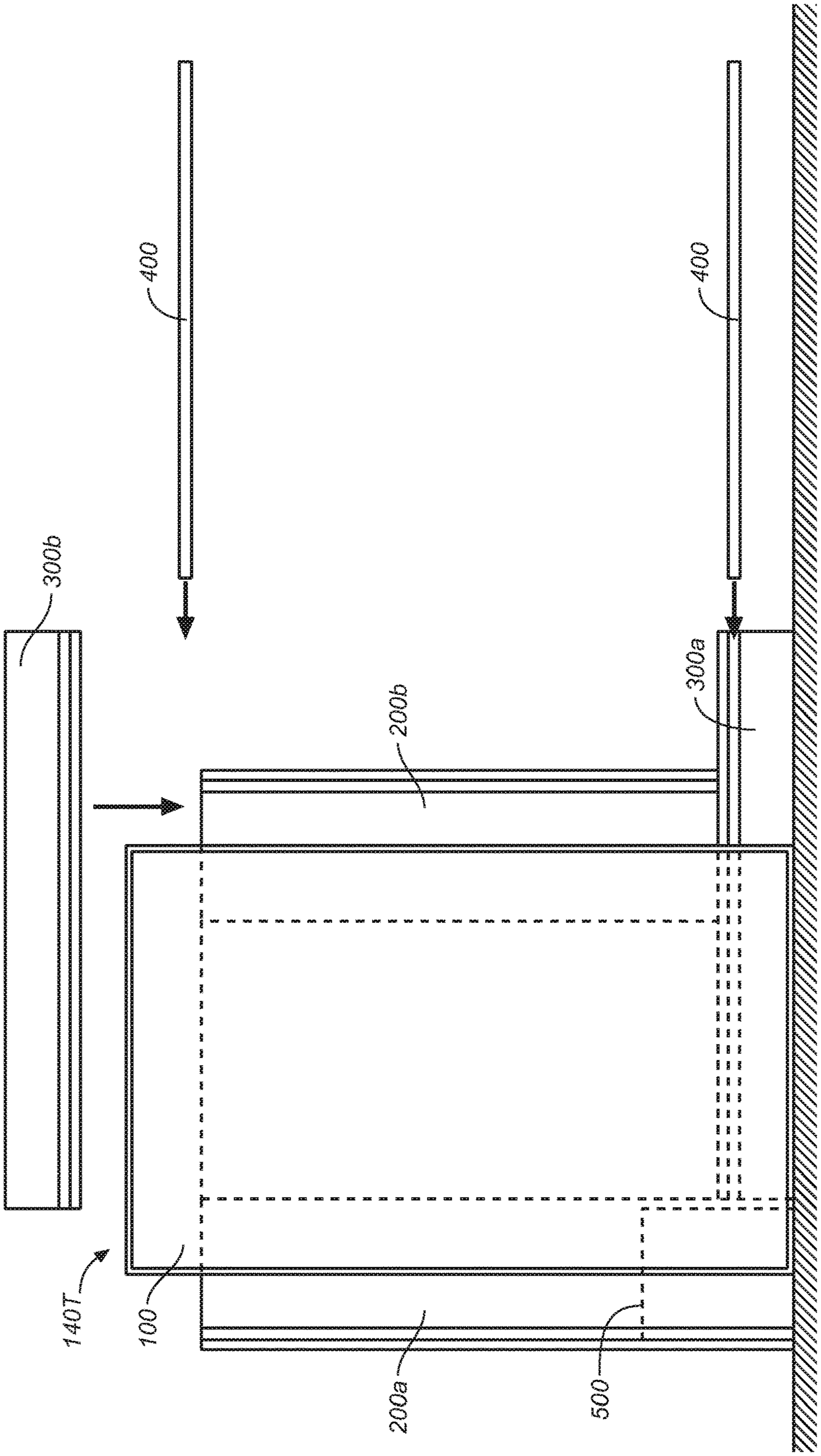


FIG. 9A



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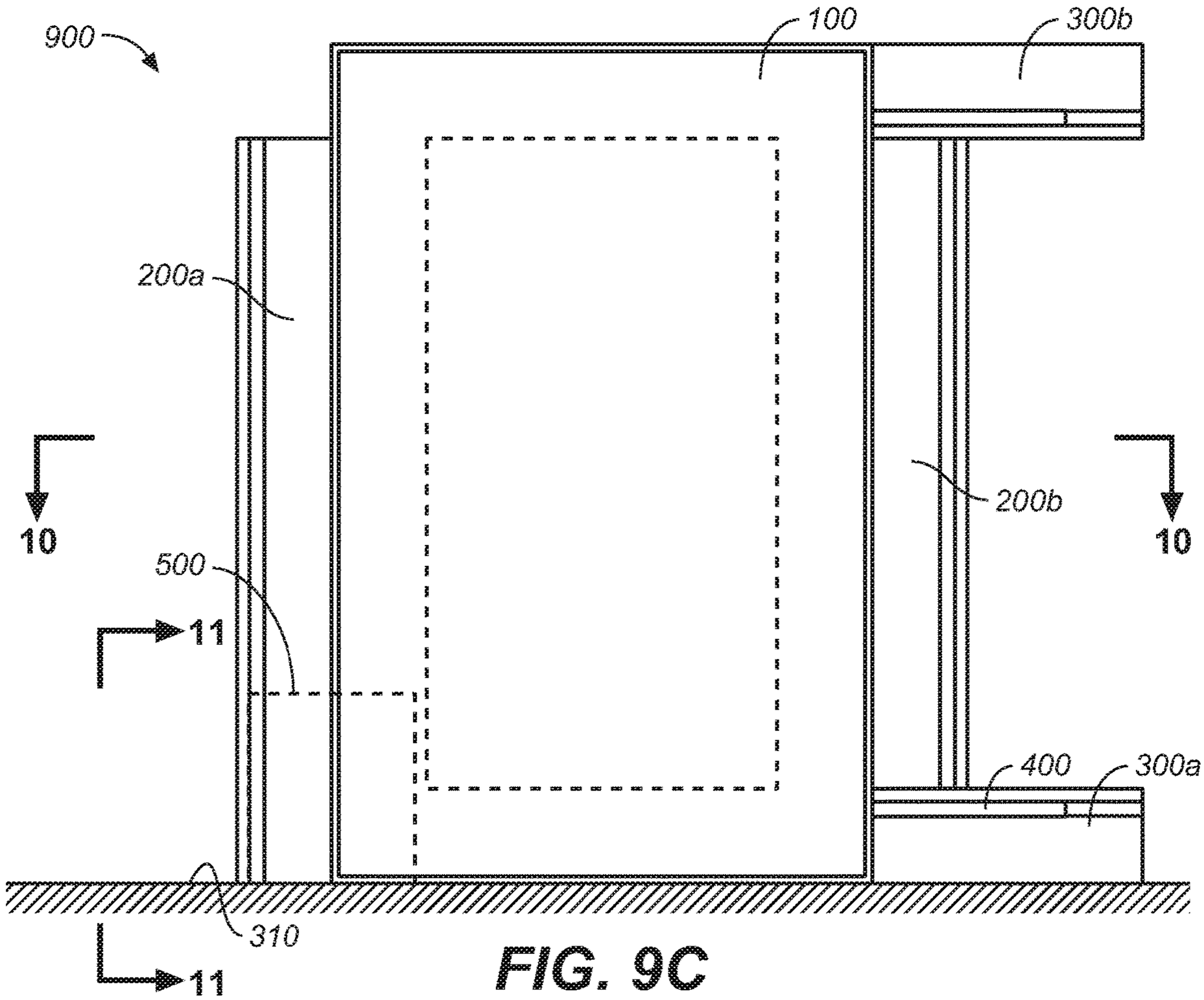
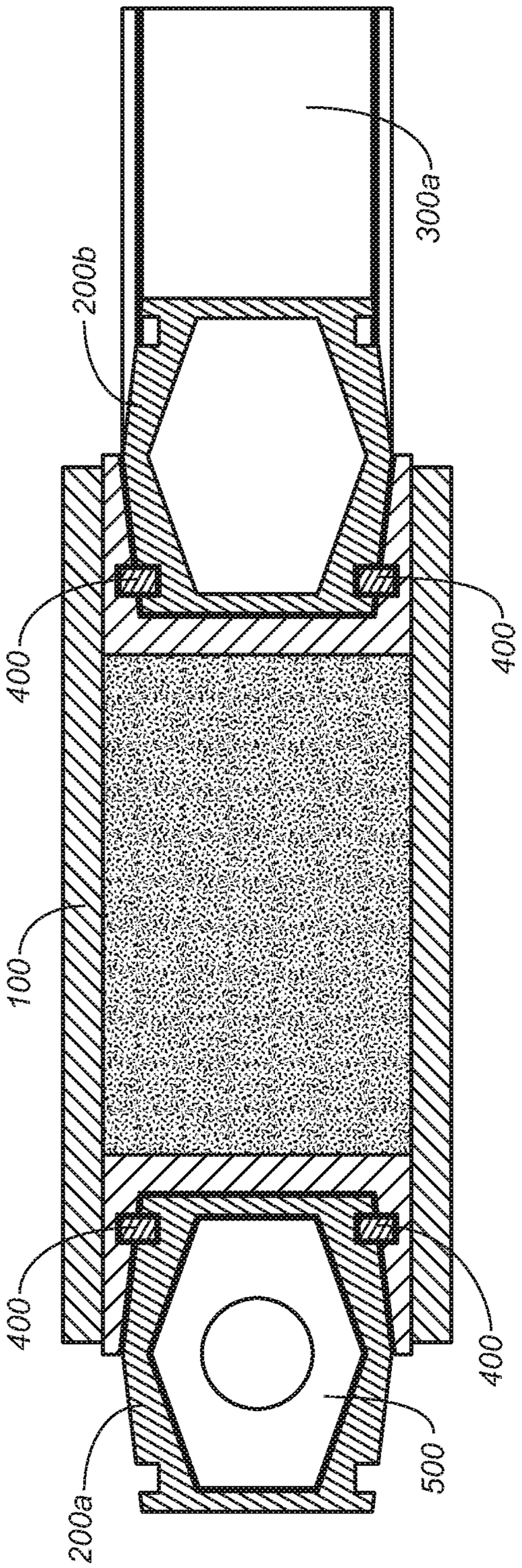


FIG. 9C



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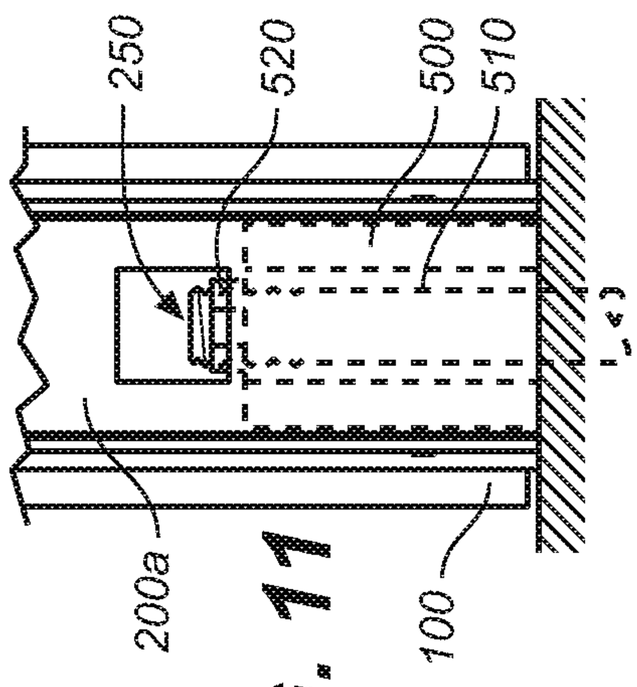

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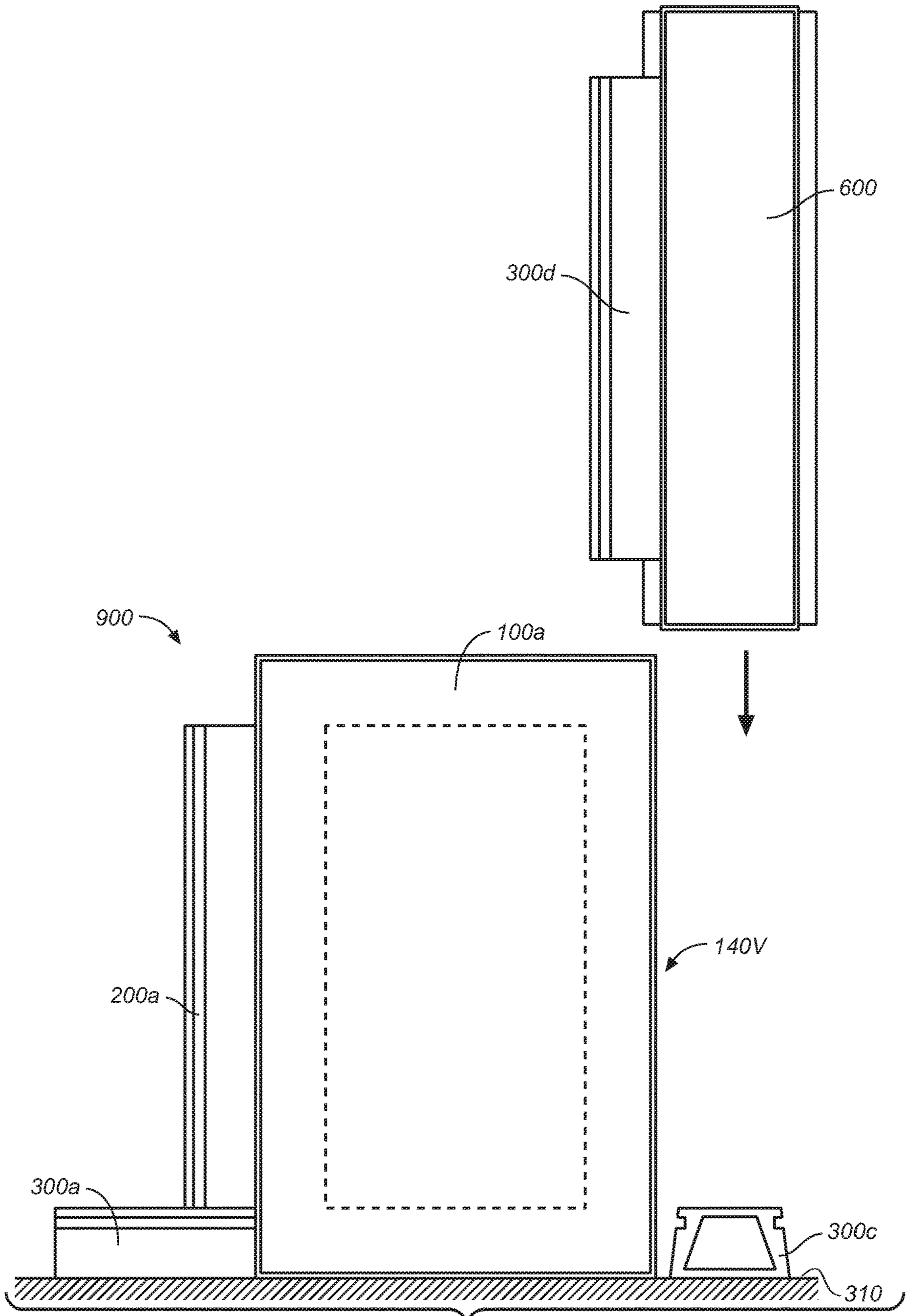
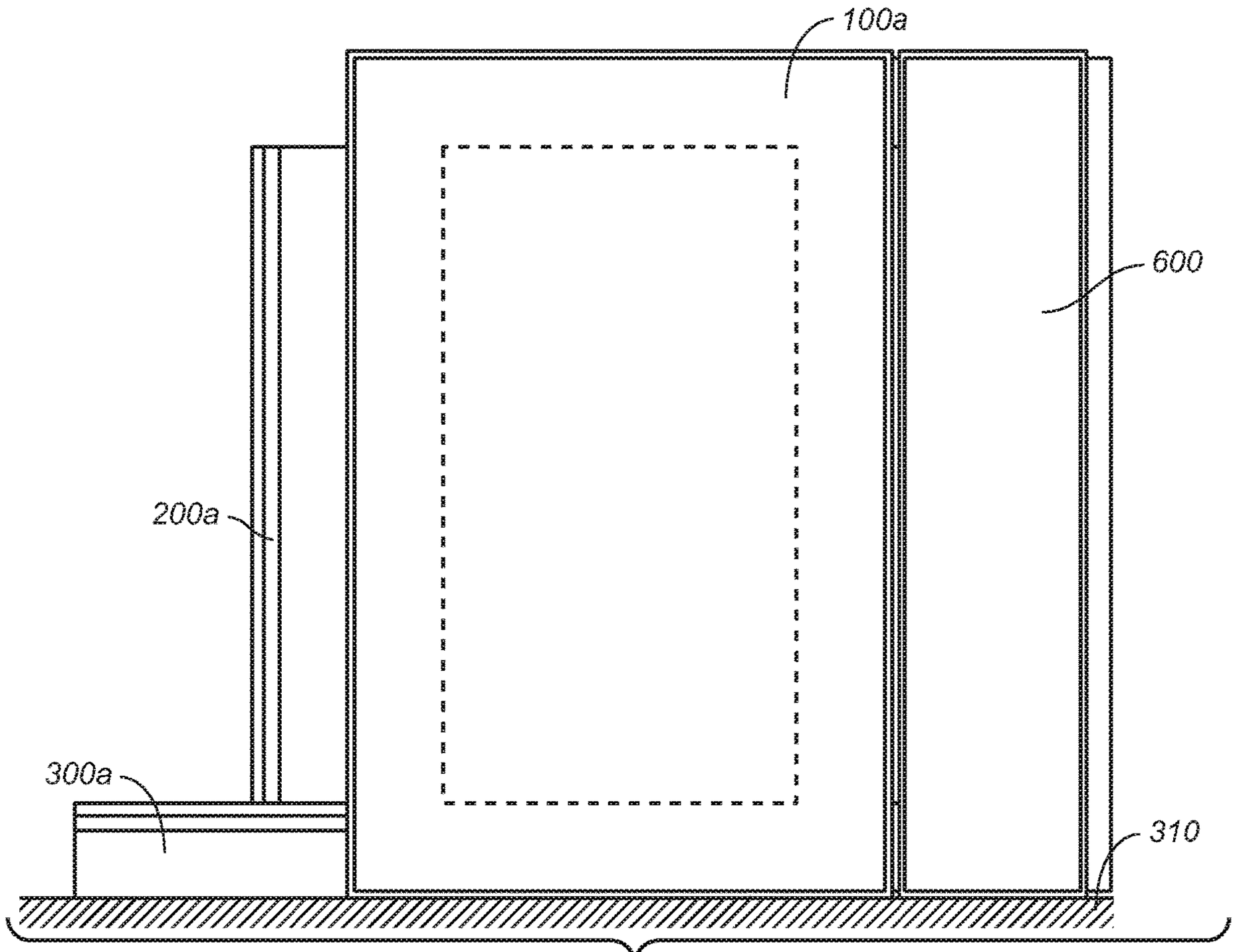


FIG. 12A



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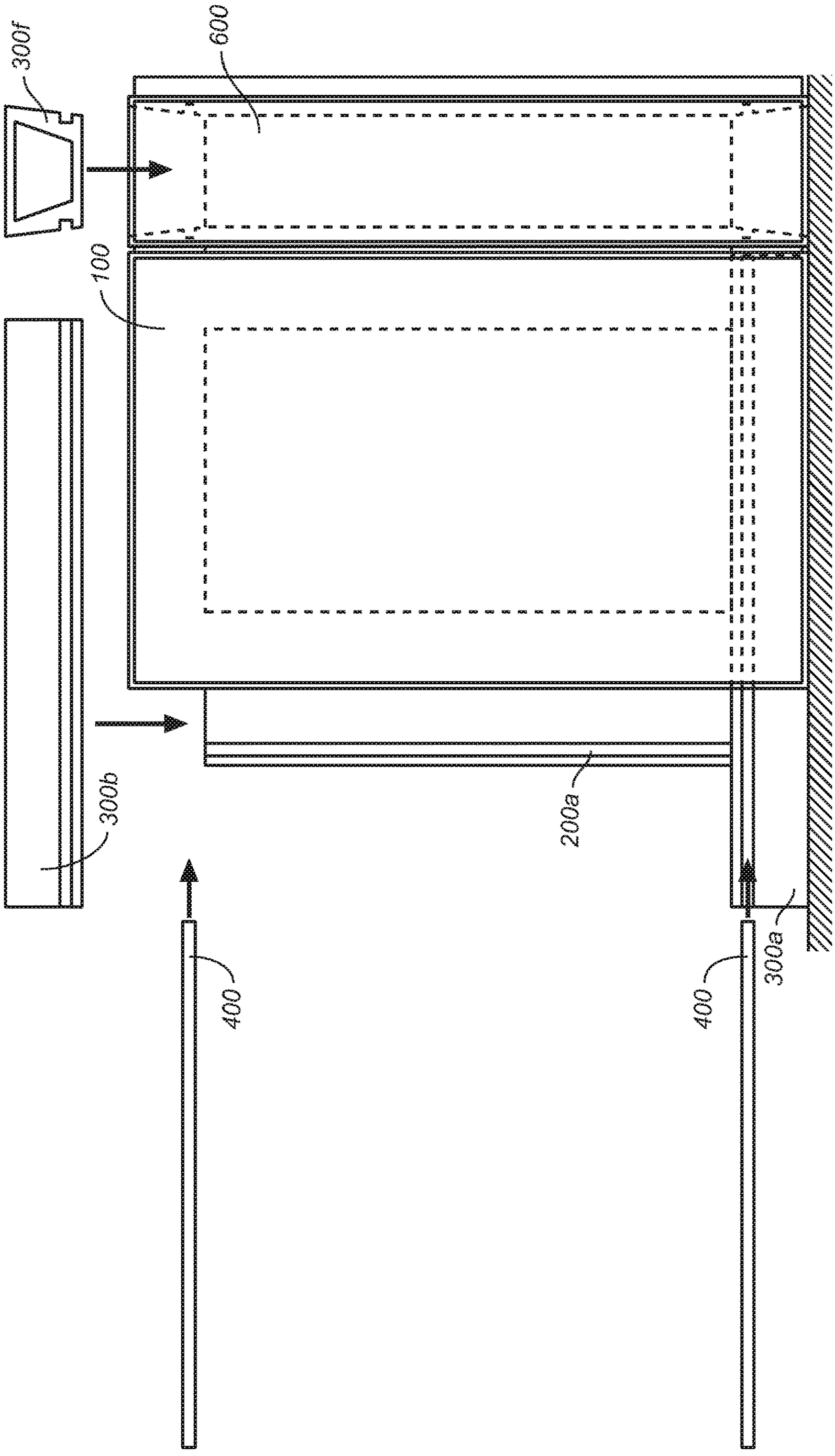

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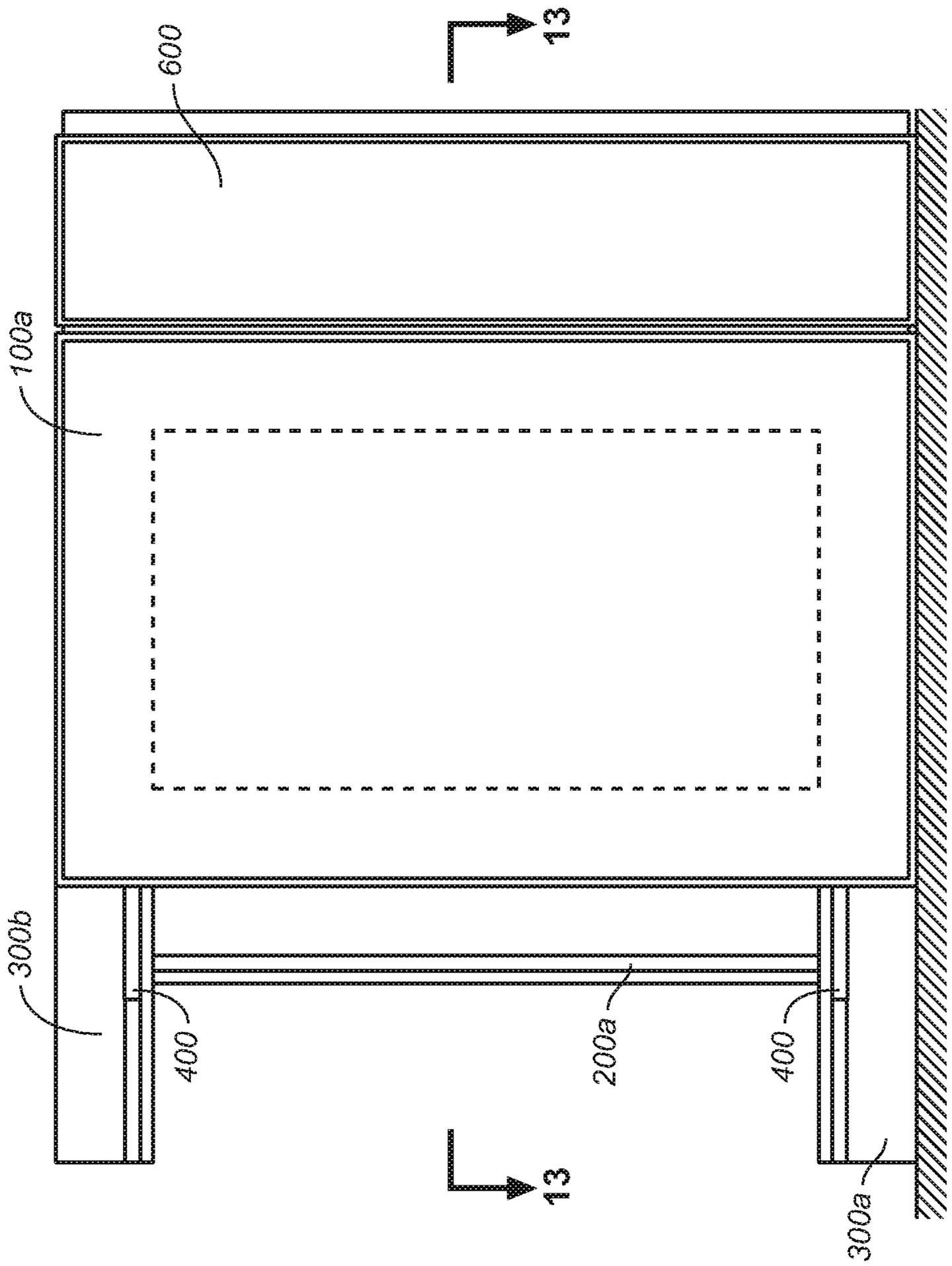

FIG. 12D

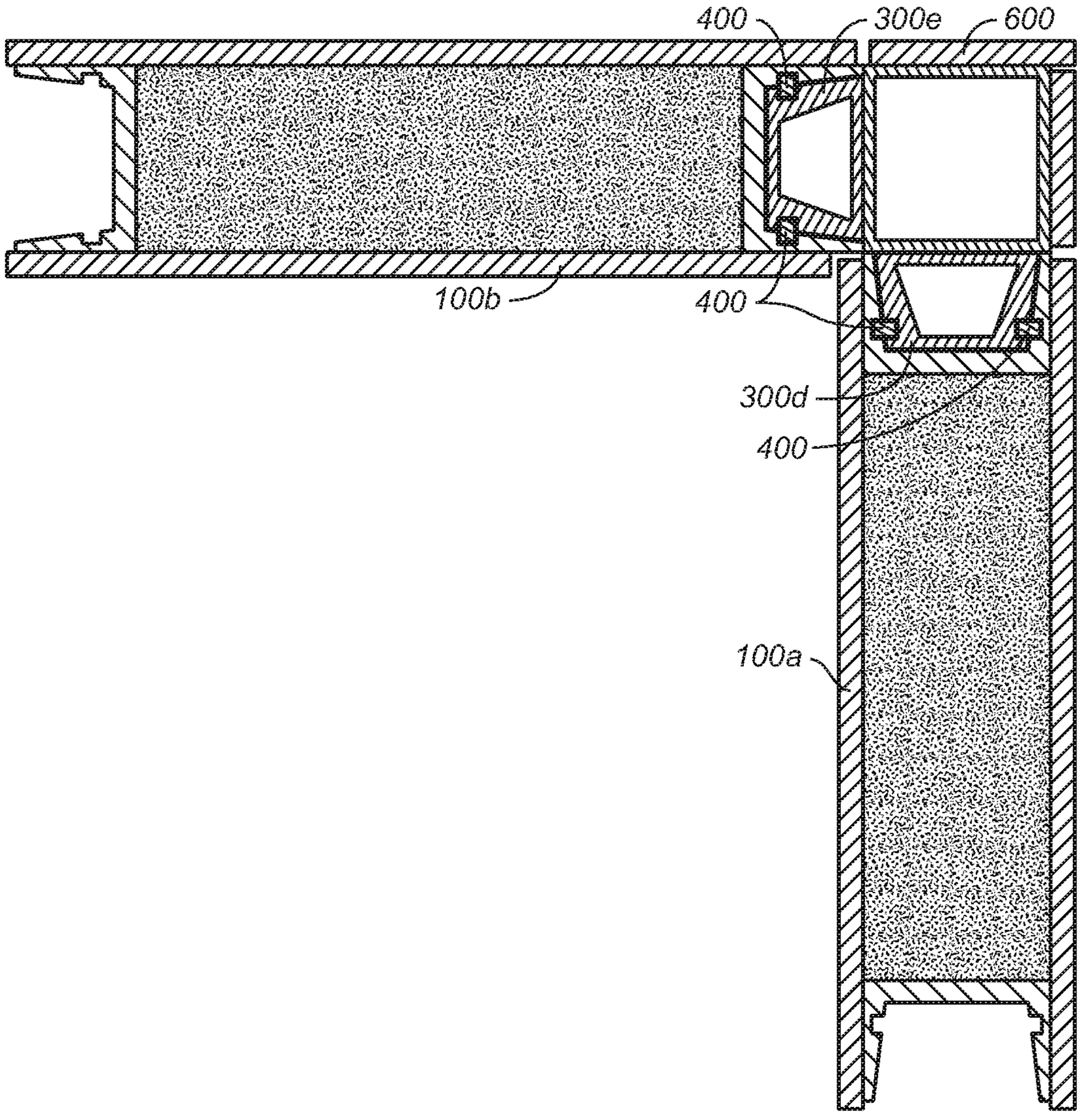

FIG. 13

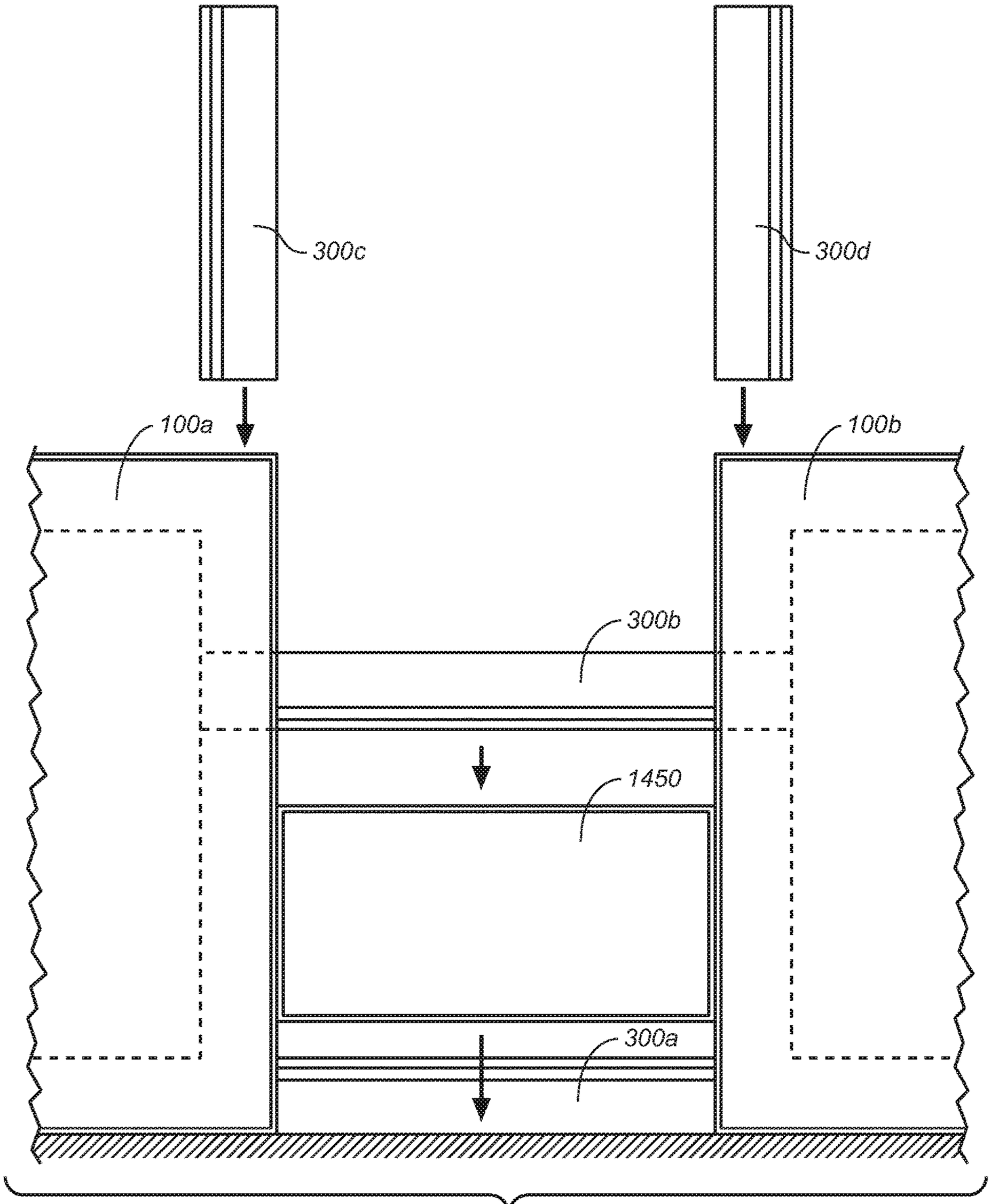

FIG. 14A

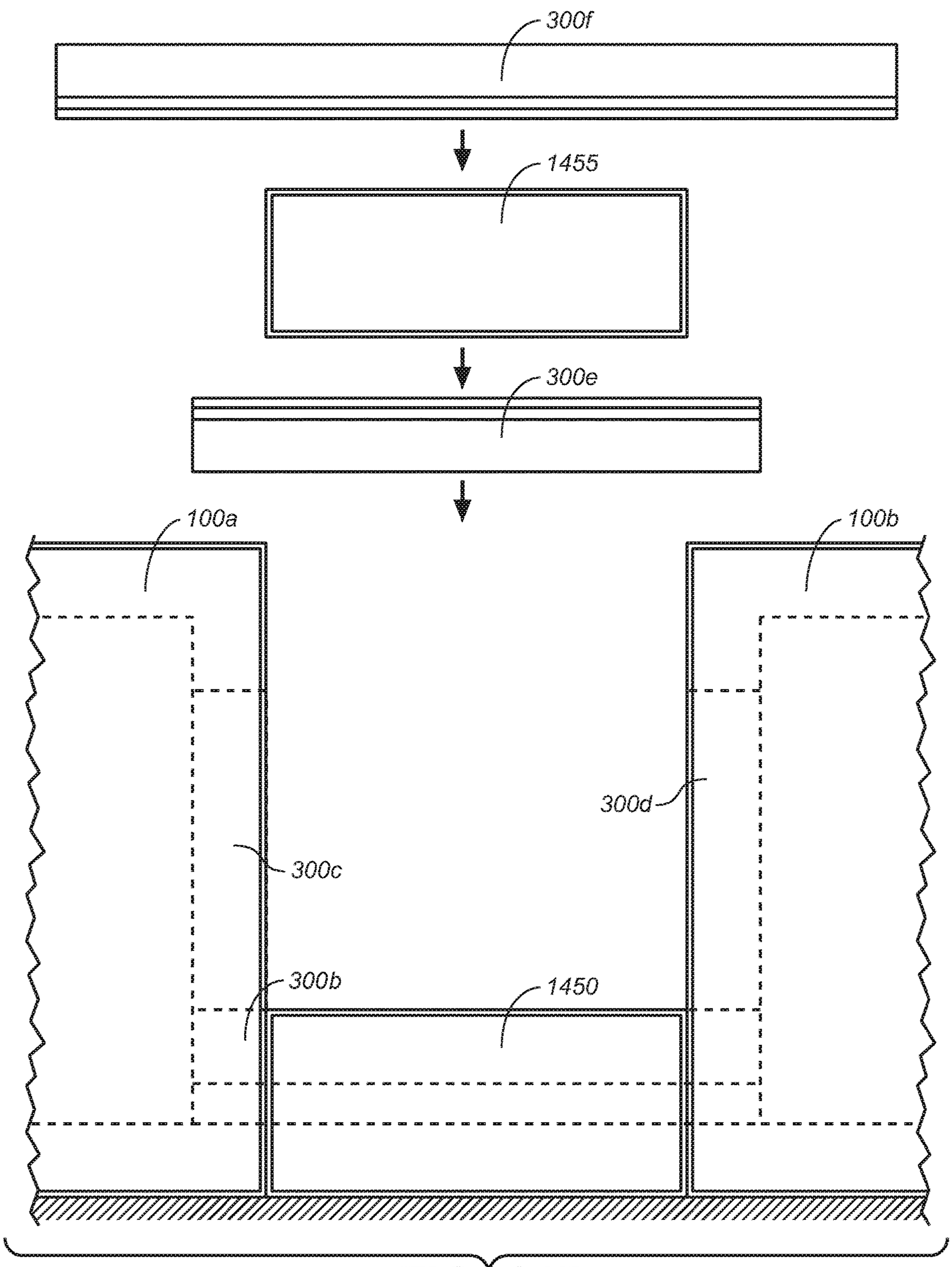

FIG. 14B

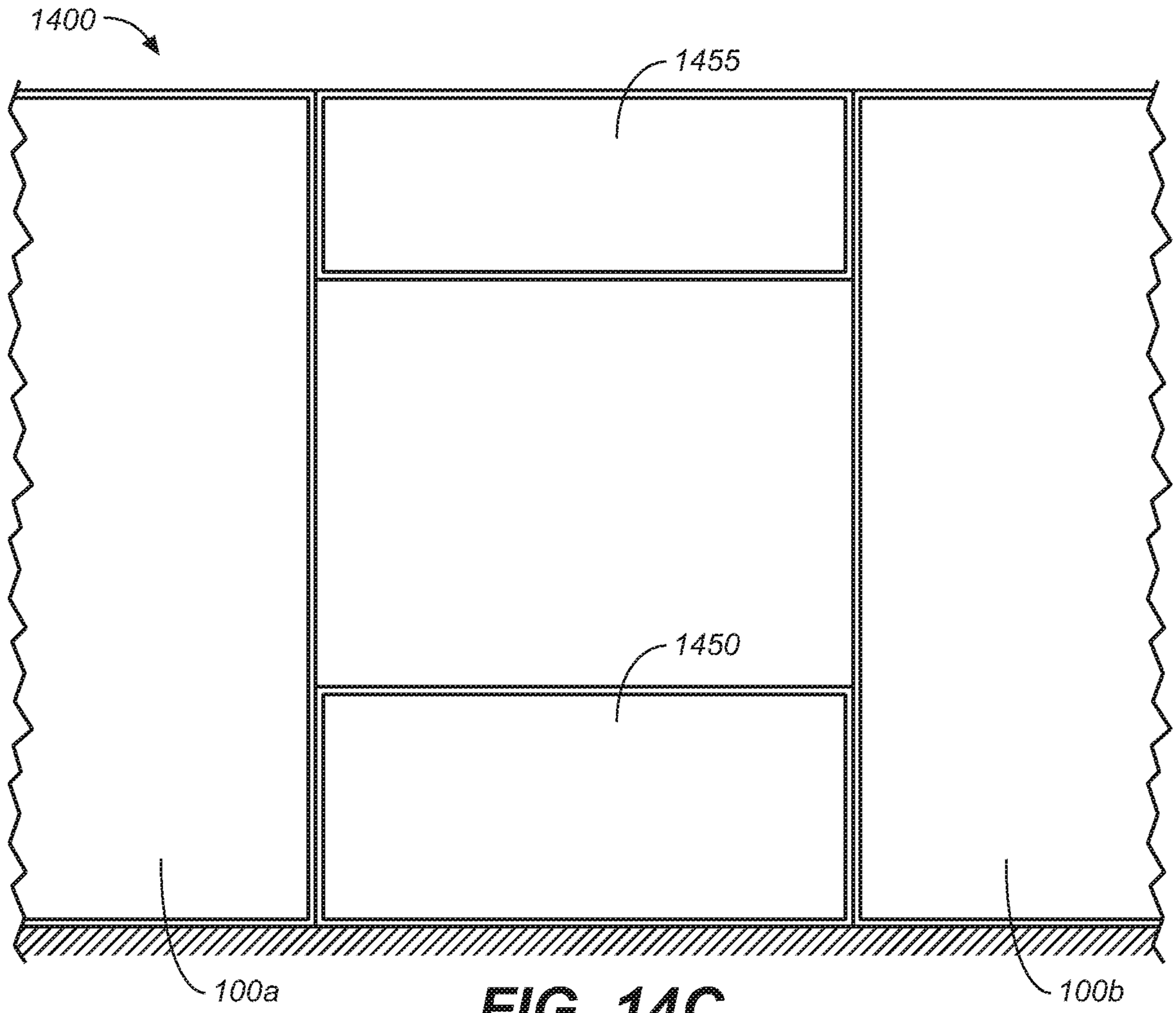

FIG. 14C

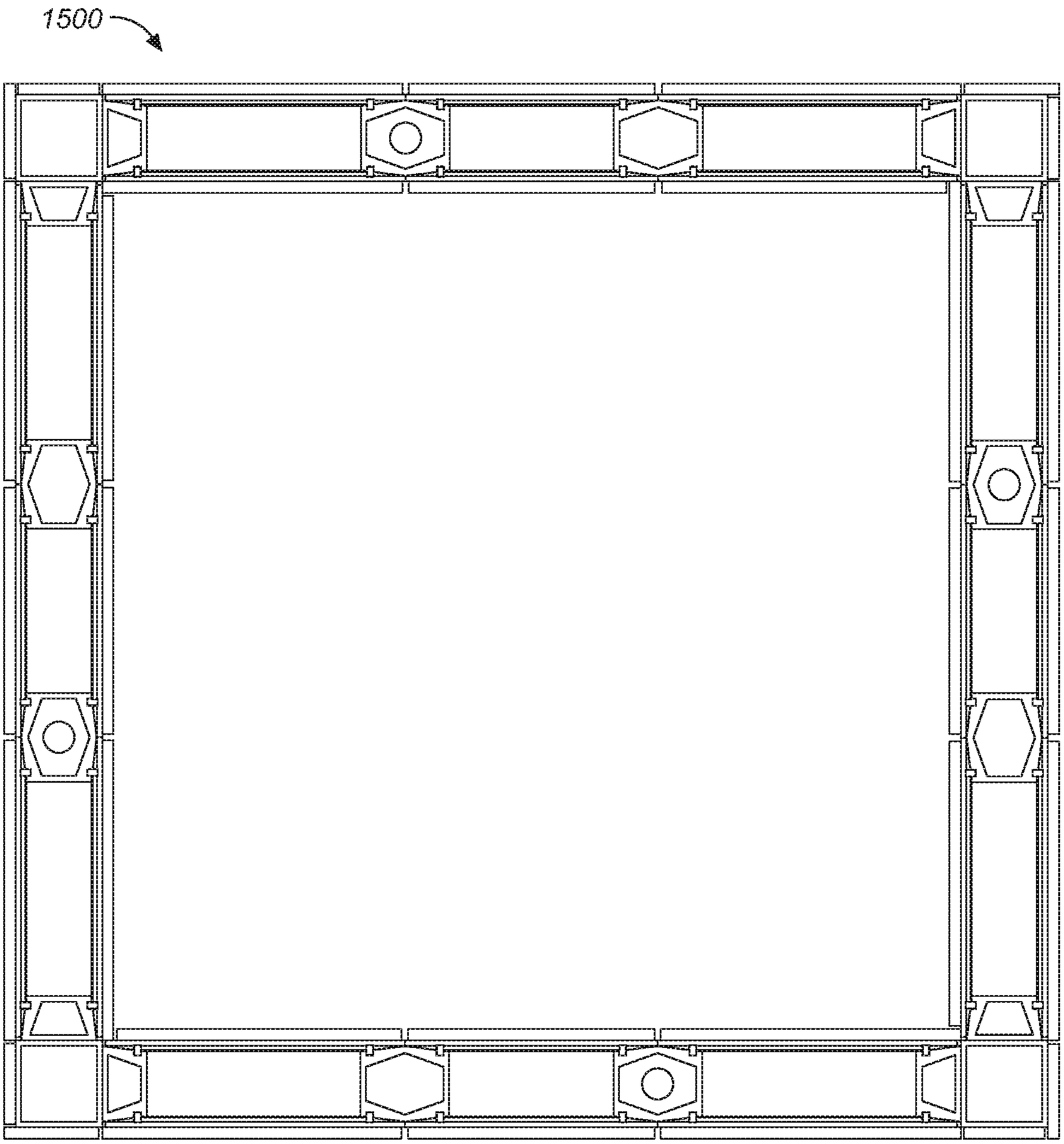

FIG. 15

SYSTEM AND METHOD FOR ASSEMBLING STRUCTURAL INSULATED PANELS

BACKGROUND

Field of the Invention

This invention relates to wall construction and, more particularly, relates to a system and method of assembling structural insulated panels (SIPs).

Discussion of the Prior Art

A structural insulated panel (SIP) is a building material consisting of an insulating layer of rigid core material sandwiched between two layers of structural board. SIPs can be used to construct walls, roofs, floors and foundation systems.

SIPs provide several benefits over conventional building framing materials. Although the cost of SIPs is typically higher than that of conventional building framing materials, a building using SIPs will generally have a tighter building envelope and superior insulating properties, leading to fewer drafts and reduced operating costs. In addition, SIPs generally come precut from the factory to conform to job specifications, such that the exterior building envelope can be built on-site quickly, reducing construction time and labor requirements. SIPs also tend to be lightweight and compact, reducing costs associated with the transportation of materials to the build site. As a result, the total life-cycle cost of a building constructed with SIPs can, in general, be lower than that of a conventionally framed building.

In addition, the environmental performance of SIPs is superior to conventionally framed construction due to superior thermal insulation, and SIPs address issues related to dampness and cold, such as compression shrinkage and cold bridging, more effectively than timber and other traditional building materials.

Prefabricated SIPs can, however, once transported to the building site, be difficult to align and securely interconnect to one another.

SUMMARY OF THE INVENTION

The present invention provides a system and method for fast and precise alignment, interconnection and installation of SIPs to form walls, floors, roofs or foundation systems. The system includes a set of splines that snugly insert into channels along the top, bottom and side edges of each SIP. Vertical alignment splines are used to align and interconnect adjacent SIPs and plate splines are used to cap edge channels of a SIP such that the edges of the SIP can securely rest on, support or be affixed to a foundation or other structural member. The system does not require the use of traditional fasteners, such as screws or nails, providing a further improvement over conventional building framing materials.

BRIEF DESCRIPTION OF THE DRAWINGS

Exemplary embodiments of the invention will now be described with reference to the accompanying drawings, in which:

FIG. **1** shows a structural insulated panel (SIP) having edge channels according to the invention.

FIG. **2** shows an alignment spline according to the invention.

FIG. **3** shows a plate spline according to the invention.

FIG. **4** shows a locking pin according to the invention.

FIGS. **5**A and **5**B show a hold-down block according to the invention.

FIG. **6** shows a corner assembly according to the invention.

FIGS. **7**A to **7**D illustrate a method of fitting and securing alignment splines and plate splines to the edge channels of a SIP according to the invention.

FIG. **8**A shows a cross-sectional view, taken along line **8**A-**8**A of FIG. **7**D, of a SIP fitted with alignment splines and plate splines according to the invention.

FIG. **8**B shows a detailed view, taken along line **8**B of FIG. **8**A, of an alignment spline secured to a SIP with a locking pin according to the invention.

FIG. **8**C shows a cross-sectional view, taken along line **8**C-**8**C of FIG. **7**D, of a plate spline inserted into the bottom channel of a SIP and secured with a locking pin according to the invention.

FIGS. **9**A to **9**C illustrate a method of assembling a wall using the system of the invention.

FIG. **10** shows a cross-sectional view, taken along line **10-10** of FIG. **9**C, of a portion of a wall assembled using the system of the invention.

FIG. **11** shows a side elevation view, taken along line **11-11** of FIG. **9**C, of a portion of a wall assembled using the system of the invention.

FIGS. **12**A to **12**D illustrate a method of assembling a corner using the system of the invention.

FIG. **13** shows a top plan view of a portion of a corner assembled using the system of the invention.

FIGS. **14**A to **14**C illustrate a method of assembling a window or door frame using the system of the invention.

FIG. **15** shows a top plan view of a wall assembly constructed using the system of the invention.

DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

Referring to the drawings, FIG. **1** shows an embodiment of a SIP (**100**) having edge channels according to the invention. The SIP is made of a rigid core (**110**) of insulating material sandwiched between two layers of structural board (**120**, **122**). The board layers (**120**, **122**) can be made of magnesium oxide board (MgO), oriented strand board (OSB), sheet metal, plywood, cement or another suitable board material. The core (**110**) can be made of expanded polystyrene foam (EPS), extruded polystyrene foam (XPS), polyisocyanurate foam, polyurethane foam, composite honeycomb (HSC) or another suitable rigid core material.

Along the four edges **130** of the SIP, between the two layers of structural board, are top, bottom and vertical side edge channels (**140**T, **140**B, **140**V), each having an inner face (**141**) and two opposing tapered surfaces (**142**) extending between the inner face and one of the edges. An alignment spline (FIG. **2**, **200**) can be inserted into any of the vertical edge channels (**140**V) and a plate spline (FIG. **3**, **300**) can be inserted into the top or bottom edge channels (**140**T, **140**B). Vertical edge channel key slots (**145**V) are disposed along and extend inwardly into the tapered surfaces (**142**) of the side edge channels (**140**V) as shown and align with alignment spline key slots (**245**) on an alignment spline (**200**) that is received in one of the side edge channels. Similarly, horizontal edge channel key slots (**145**H) disposed along and extending inwardly into the tapered surfaces (**142**) of top or bottom edge channels (**140**T, **140**B) align with plate spline keys slots (FIG. **3**, **345**) provided on a plate spline (**300**) that is received in either of the top or

bottom edge channels. Together, each pair of aligned key slots is cooperatively configured to form a locking channel to receive a locking pin (FIG. **4**, **400**) for securely locking the inserted alignment spline (**200**) or a plate spline (**300**) in place in one of the edge channels of the SIP (**100**).

As seen in FIG. **2**, an alignment spline (**200**) forms a hexagonal cross-section, the opposing, symmetrical halves of which each conform to the shape of the edge channels (**140**) of the SIP (**100**), and which has a hollow core (**270**). The alignment spline can suitably have a differently shaped cross-section but should have mirror symmetry of a shape closely conforming to that of the edge channels of the SIP (**100**). The alignment spline allows two SIPs having standardized edge channels to be securely interconnected. The illustrated alignment spline shows each half having an end face (**210**) and two oppositely facing tapered faces (**220**) extending from the middle (**230**) of the spline to the end face (**210**). Each alignment spline has four outwardly facing alignment spline key slots (**245**), one extending into each of the tapered faces (**220**), that align with the vertical keyslots (**145**V) on side edge channels (**140**V) to form locking channels (**145**V/**140**V) for receiving locking pins (**400**). An opening (**250**) on the side of the alignment spline provides access to a hold-down block (see FIGS. **5**A and **5**B), which may be received in the hollow core (**270**) of the alignment spline for securing the alignment spline to a foundation member, as discussed below with respect to FIGS. **9**A and **11**.

Referring next to FIG. **3**, it can be seen that a plate spline (**300**) is effectively half of an alignment spline (**200**), or an alignment spline divided along a longitudinal plane. In the illustrated embodiment, the plate spline has a trapezoidal cross-section that closely conforms to the shape of the top and bottom edge channels (**140**T, **140**B) of the SIP (**100**). The plate spline can be snugly inserted into one of the top or bottom edge channels of the SIP (**100**) to form a flat edge surface which can securely rest on or against, support or be affixed to a foundation or other anchoring member, as further discussed below with respect to FIGS. **7**A to **7**D. The illustrated plate spline (**300**) has two plate spline key slots (**345**) that align with horizontal key slots (**145**H) in the to or bottom edge channels (**140**T, **140**B) of the SIP (**100**) to cooperatively form two locking channels (**145**H/**345**) for receiving locking pins (**400**). The hollow cores (**270**, **370**) of both the alignment spline (**200**) and plate spline (**300**) can house electrical wiring or plumbing components.

One embodiment of a locking pin (**400**), as seen in FIG. **4**, is configured to be inserted into a locking channel for securing either an alignment spline or plate spline to an edge channel of the SIP (**100**). An inserted locking pin (**400**) prevents outward movement or shifting of the inserted alignment spline (**200**) or plate spline (**300**) within the edge channel (**140**H, **140**V). The key slots of the edge channels (**140**H, **140**V), alignment spline (**200**) or plate spline (**300**) may be tapered from a wider width at their opening insert ends to a narrower width at their midpoints to facilitate insertion of the locking pin and to aid in the snug fitting of the alignment spline or plate spline within the edge channel.

The edge channels (**140**) of the SIP, alignment spline (**200**), plate spline (**300**) and locking pin (**400**), can all suitably be made of fiber reinforced plastic (i.e., fiberglass), which provides exceptional strength, as well as resistance to moisture buildup, mold and termites. Fiberglass is an exceptional material for use in buildings located in hurricane and flood prone areas. It should be understood, however, that the edge channels, splines and locking pins can be manufactured from other strong, high-performance materials.

With reference now to FIGS. **5**A and **5**B, a hold-down block (**500**) may be used in the formation of walls constructed using one or more SIPs (**100**), for securing a wall formation to a foundation. The hold-down block is anchored to the foundation using a suitable anchor bolt, such as the illustrated J-bolt (**510**), installed in a concrete foundation wall. The hollow core (**540**) of the hold-down block is sized large enough to loosely receive the anchor bolt (**510**) and such that an exact fit of the anchor bolt (**510**) within the hollow core (**540**) is not required. This provides some margin of error for the alignment of the hold-down block and anchor bolt components during installation.

With additional reference to FIGS. **9**A-**11**, an alignment spline (**200**A) may be placed over the hold-down block (**500**) to secure the alignment spline in place. The top of the hold-down block may be tapered to facilitate receipt of the hold-down block (**500**) into the hollow core of the alignment spline (**200**A). Once the alignment spline is placed over the anchor bolt, a nut (**520**) and washer (**530**) can be accessed through the opening (**250**) on the side of the alignment spline (**200***a*) to securely fasten the hold-down block with the anchor bolt to the foundation member (FIG. **5**B).

Referring next to FIG. **6**, a corner assembly (**600**) comprises a corner column (**610**) with structural board (**620**, **622**) affixed to two of its faces and plate splines (**300***a*, **300***b*) affixed to its other two faces. The corner column (**610**) is a hollow, rectangular extrusion of fiberglass or other strong material. As discussed in greater detail below with respect to FIGS. **12**A to **13**, the corner assembly (**600**) is used to construct a corner. Like the alignment spline and plate spline components, the corner assembly has a hollow core (**670**) that can house electrical wiring or plumbing components.

A method of fitting alignment splines (**200***a*, **200***b*) and plate splines (**300***a*, **300***b*) to the edge channels of a SIP (**100**) is now discussed with respect to FIGS. **7**A-**7**D. In FIG. **7**A, a bottom plate spline (**300***a*) is affixed to a foundation member (**310**) and a SIP (**100**) is set on the foundation member with the bottom plate spine (**300***a*) snugly received in the bottom edge channel (**140**B) of the SIP (**100**) (see FIG. **7**B). Key slots (**345***a*) in the bottom plate spline (**300***a*) align with the horizontal key slots (**145**H) in the bottom edge channel (**140**B) of the SIP (**100**) forming locking channels (**145**H/**345***a*).

Alignment splines (**200***a*, **200***b*) are inserted into the vertical edge channels (**140**V) of the SIP (**100**). Key slots (**245***a*, **245***b*) in the alignment splines (**200***a*, **200***b*) align with vertical key slots (**145**V) in the vertical edge channels (**140**V) of the SIP (**100**) forming locking channels (**145**V/**245**).

As seen in FIG. **7**B, locking pins (**400**) are inserted into the resulting locking channels (**145**V/**245**) of the alignment splines (**200***a*, **200***b*) and vertical edge channels (**140**V) for securing the alignment splines (**200***a*, **200***b*) to the SIP (**100**). As seen in FIG. **7**C, locking pins (**400**) are inserted into the locking channels (**145**H/**345***a*) of the bottom plate spline (**300***a*) and the bottom edge channel (**140**B) of the SIP (**100**) for securing the bottom plate spline (**300***a*) to the SIP (**100**).

As shown in FIG. **7**D, a top plate spline (**300***b*) is inserted into the top edge channel (**140**T) of the SIP (**100**), with the key slots (**345***b*) of the top plate spline (**300***b*) aligning with the horizontal key slots (**145**H) of the top edge channel (**1401**) of the SIP (**100**). The top plate spline (**300***b*) is locked into the top edge channel (**140**T) with locking pins (**400**).

As shown in FIGS. **8**A-**8**B, the alignment splines (**200***a*, **200***b*) are snugly received in the vertical edge channels (**140**V) of the SIP (**100**) and the locking pins (**400**) are snugly received in the locking channels (**145**V/**245**). The

tight fit of the inserted locking pins (**400**) within the locking channels (**145**V/**245**) prevents outward movement or shifting of the alignment splines (**200***a*, **200***b*), thus securing the alignment splines (**200***a*, **200***b*) within the vertical edge channels of the SIP (**100**).

In FIG. **8**C, the bottom plate spline (**300***a*) is shown snugly received in the bottom edge channel (**140**B) of the SIP (**100**) and two locking pins (**400**) are snugly received in the horizontal locking channels (**145**H/**345**). The tight fit of the inserted locking pins (**400**) prevents movement or shifting of the SIP (**100**) on the bottom plate spline (**300***a*). The top plate spline (**300***b*) is securely locked into the top edge channel (**140**T) of the SIP (**100**) in similar fashion (see FIG. **7**D).

A method of fitting alignment splines and plate splines to the edge channels of a SIP to form a wall, and to secure the wall to a foundation using a hold-down block (**500**), is now discussed with reference to FIGS. **9**A-**9**C. In FIG. **9**A, a hold-down block (**500**) is secured to a foundation member (**310**) with an anchor bolt. A first alignment spline (**200***a*) is inserted into a vertical edge channel (**140**V) of the SIP (**100**) and slid over the hold-down block (**500**). As shown in FIG. **11**, the opening (**250**) on the side of the first alignment spline (**200***a*) provides access to the nut (**520**) and washer (**530**) used to secure the hold-down block (**500**) to anchor bolt (**510**). In another embodiment, not illustrated, locking pins or other fasteners may be used to secure the first alignment spline (**200***a*) to the hold-down block (**500**). A second alignment spline (**200***b*) is inserted into the other vertical edge channel (**140**V) of the SIP (**100**) and locking pins (**400**) are used to secure both alignment splines (**200***a*, **200***b*) to the SIP (**100**).

In FIGS. **9**B-**9**C, a top plate spline (**300***b*) is inserted into the top edge channel (**140**T) of the SIP and locking pins (**400**) are inserted into the locking channels formed by the aligned key slots of the plate splines (**300***a*, **300***b*) and the horizontal edge channels (**140**V) of the SIP (**100**), securing both plate splines (**300***a*, **300***b*) to the SIP (**100**).

FIG. **10** shows a detailed view of the interconnected SIP (**100**), alignment splines (**200***a*, **200***b*), hold-down block (**500**) and plate spline (**300***a*).

A method of assembling a corner with two SIPS (**100***a*, **100***b*) according to the invention is now described with respect to FIGS. **12**A-**13**. As seen in FIG. **12**A, with the first SIP (**100***a*) set into place, another bottom plate spline (**300***c*) is affixed to the foundation member (**310**), perpendicular to the SIP (**100***a*). A corner assembly (**600**) is then lowered over the affixed bottom plate spline (**300***c*) and one of the corner assembly plate splines (**300***d*) is received in the open vertical edge channel (**140**V) of the SIP (**100***a*), securing the corner assembly (**600**) to the foundation (**310**) and the first SIP (**100***a*), as shown in FIG. **12**B. The second SIP (**100***b*) is then secured to the corner assembly (**600**) by receiving the other corner assembly plate spline (**300***e*) in a vertical edge channel of the second SIP (**100***b*), as shown in FIG. **13**. In FIGS. **12**C-**13**, top plate splines (**300***b*, **3000** are inserted into the top edges of the SIPs (**100**, **100***b*) and secured with locking pins (**400**) to form flat top edge surfaces on the SIPs (**100**, **100***b*), completing the corner.

A method of assembling a window or door frame using the system of the invention is now discussed with respect to FIGS. **14**A-**14**C.

In FIG. **14**A, two wall SIPs (**100***a*, **100***b*) are interconnected with a gap therebetween by a bottom plate spline (**300***a*). A bottom frame SIP (**1450**) is installed on the bottom plate spline, (**300***a*) and a first intermediate plate spline (**300***b*) is installed in the top edge channel of the bottom frame SIP (**1450**). Vertical plate splines (**300***c*, **300***d*) are then inserted into the vertical edge channels of the two wall SIPs (**100***a*, **100***b*).

In FIG. **14**B, a second intermediate plate spline (**300***e*) is inserted into the vertical edge channels of the two wall SIPs (**100***a*, **100***b*) where it rests on top of the vertical plate splines (**300***c*, **300***d*) secured therein. A top frame SIP (**1455**) is then disposed on the second intermediate plate spline (**300***e*) and a top plate spline (**300***f*) is inserted into the top edges of the two wall SIPs (**100***a*, **100***b*) and the second frame SIP (**1455**). Throughout the various steps of assembling, locking pins (not shown) are used to secure the interconnected wall components. The completed window or door frame (**1400**) is shown in FIG. **14**C.

FIG. **15** shows a top plan view of a wall assembly (**1500**) constructed according to the steps for constructing walls and corners as shown and described in FIGS. **9**A-**9**C and **12**A-**12**D.

Beyond use in building construction, the splines, hold-down blocks and locking pins of the invention can be sized for small-scale applications, such as for interconnecting the panels of a scale model or toy construction set.

Certain embodiments of a system and method for precisely aligning, interconnecting and securing SIPs have thus been described and illustrated herein in detail. These embodiments are merely exemplary implementations of the invention and are not to be taken as limiting, the spirit and scope of the invention being limited only by the terms of the appended claims and their legal equivalents.

I claim:

1. A system for assembling structural insulated panels, the system comprising:

a structural insulated panel (SIP) having one or more edges, at least one of said one or more edges including an edge channel extending into at least one of said one or more edges, the edge channel having an inner face and two opposing tapered surfaces extending between the inner face and the one or more edges, and an edge channel key slot extending into at least one of said opposing tapered surfaces,

an alignment spline having symmetrical halves, each symmetrical half including two oppositely facing tapered faces complementary to the tapered surfaces of said edge channel and having an alignment spline key slot extending into at least one of said two oppositely facing tapered faces of said alignment spline,

a locking pin, and

an assembled configuration in which one of the symmetrical halves of the alignment spline is disposed in the edge channel of the SIP, the edge channel key slot is aligned with the alignment spline key slot cooperatively forming a locking channel, and the locking pin is disposed in the locking channel thereby securing the alignment spline to the SIP.

2. The system for assembling structural insulated panels of claim **1** wherein:

the alignment spline has a polygonal cross-section.

3. The system for assembling structural insulated panels of claim **2** wherein:

said polygonal cross-section is hexagonal.

4. The system for assembling structural insulated panels of claim **1** wherein: said one or more edges includes two side edges, each of said two side edges having a side edge channel.

5. The system for assembling structural insulated panels of claim **4** wherein: said one or more edges includes top and bottom edges, the top edge having a top edge channel, the

bottom edge having a bottom edge channel, each of said top edge and bottom edge channels having two opposing tapered surfaces and an edge channel key slot extending into at least one of said two opposing tapered surfaces.

6. The system for assembling structural insulated panels of claim **5** further comprising:

a plate spline including an outer face and two oppositely facing tapered faces complementary to the two opposing tapered surfaces of said top and bottom edge channels, and a plate spline key slot extending into at least one said two oppositely facing tapered faces, and

a second locking pin,

wherein, in the assembled configuration, the plate spline is disposed in one of the top edge channel and the bottom edge channel, the plate spline key slot is aligned with the edge channel key slot of one of the two opposing tapered surfaces of said top or bottom edge channel to form a second locking channel, the second locking pin is disposed in the interior of the second locking channel thereby securing the plate spline to the SIP, and the outer face of the plate spline forms a flat surface along one of said top and bottom edges of the SIP.

7. The system for assembling structural insulated panels of claim **1** wherein:

the alignment spline has a hollow core.

8. The system for assembling structural insulated panels of claim **7** further comprising:

a hold-down block configured to be secured to a building foundation and configured to be disposed in the interior of the hollow core of said alignment spline for restriction of lateral movement of the alignment spline with respect to the building foundation.

9. The system for assembling structural insulated panels of claim **8** further comprising:

a fastening mechanism for securing the hold-down block to the building foundation,

the alignment spline having a plurality of faces and an opening in one of said faces for providing access to the fastening mechanism for securing the hold-down block that has been received in the hollow core of the alignment spline to the building foundation.

10. A system for assembling structural insulated panels, the system comprising:

a structural insulated panel (SIP) having two oppositely facing side edges, an edge channel extending into at least one of the two side edges, the edge channel having an inner face and two opposing tapered surfaces extending between the inner face and the two oppositely facing side edges, and an edge channel key slot extending into at least one of said two opposing tapered surfaces,

an alignment spline having a plurality of faces, a hollow core, and a hexagonal cross-section including symmetrical halves, each of said symmetrical halves including two oppositely facing tapered faces corresponding to the two opposing tapered surfaces of said edge channels and having an alignment spline key slot extending into at least one of said two oppositely facing tapered faces,

a hold-down block configured to be secured to a building foundation and configured to fit into the hollow core of said alignment spline for restriction of lateral movement of the alignment spline with respect to the building foundation, one of said plurality of faces of said alignment spline having an opening for providing access to a fastening mechanism for securing said hold-down block received in the hollow core of the alignment spline to a building foundation,

a locking pin, and

an assembled configuration in which the hold-down block is disposed in the interior of the hollow core of the alignment spline and is secured to the building foundation, one of the halves of the alignment spline is disposed in the interior of one of the edge channels of the SIP, the edge channel key slot of said one of the edge channels is aligned with the alignment spline key slot of the alignment spline to form a locking channel, and the locking pin is disposed in the interior of the locking channel thereby securing the alignment spline to the SIP.

11. The system for assembling structural insulated panels of claim **10** wherein:

said SIP further includes top and bottom edges, each of said top and bottom edges including an edge channel.

12. The system for assembling structural insulated panels of claim **10** further comprising:

a plate spline having the shape of one of the halves of the alignment spline, the plate spline including an outer face and two oppositely facing tapered faces complementary to the two opposing tapered surfaces of said top and bottom edge channels and having a plate spline key slot extending into at least one of said two oppositely facing tapered faces, and

a second locking pin,

wherein, in the assembled configuration, the plate spline is disposed in one of the top edge channel and the bottom edge channel, the plate spline key slot is aligned with the edge channel key slot of one of the two opposing tapered surfaces of said top or bottom edge to form a second locking channel, the second locking pin is disposed in the interior of the second locking channel thereby securing the plate spline to the SIP, and the outer face of the plate spline forms a flat surface along one of said top and bottom edges of the SIP.

13. The system for assembling structural insulated panels of claim **1** wherein:

said SIP includes two spaced-apart parallel structural boards,

said edge channel includes an inner face that is perpendicular to and extends between said structural boards, and

said two opposing tapered surfaces extend between said inner face and said at least one edge.

14. The system for assembling structural insulated panels of claim **13** wherein:

the symmetrical halves extend from a middle of said alignment spline,

each half of said alignment spline includes an outer face, and

said two oppositely facing tapered faces extend from the middle of the alignment spline to the opposite end of said outer face.

15. The system for assembling structural insulated panels of claim **1** wherein:

said first edge channel key slot is facing inward toward said edge channel, and

said alignment spline key slot is facing outward away from one of said two oppositely facing tapered faces of said alignment spline.

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